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COMMITTED TO PROTECTION OF THE ENVIRONMENT

COMPREHENSIVE MONITORING PROGRAM

Contract Number DAAA15-87-0095

FINAL SURFACE WATER DATA ASSESSMENT **REPORT FOR 1989**

JUNE 1990

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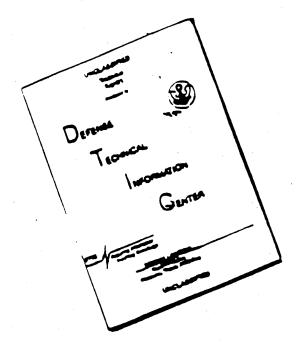
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APPENDIX A

(Appendices A-1 to A-6)

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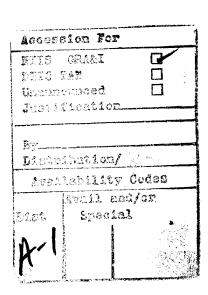


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APPENDIX A

Surface-Water Quantity Data for Water Year 1989

APPENDIX A-1

Surface-Water Station Survey Information

APPENDIX A-1.1

Monitoring Station Survey Information

Station #	Location	Northing	Easting	Elevation/GH
SW01001	N. Uvalda Interceptor	175,588.02	2,187,896.41	5,260.55 = TBM 5,258.92 = 3.33 on SG
SW01003	South Plants Ditch	177,784.84	2,185,793.81	5,255.61 = TBM 5,248.78 = 0.00 on SG 5,253.13 = PZF on SW Weir 5,252.21 = PZF on S Weir
SW01004	Upper Derby Lake	176,932.23	2,187,034.25	5,247.77 = 0.00 on SG
SW01005	Lower Derby Lake	176,414.44	2,183,945.48	5,230.17 = 0.00 on SG
SW02001	Ladora Weir	176,311.48	2,183,662.77	5,235.49 = TBM 5,228.84 = 0.00 on SG
SW02003	Ladora Lake	177,726.61	2,179,691.86	5,222.11 = 15.00 on SG
SW02004	Lake Mary	177,378.84	2,178,434.27	5,202.39 = 0.00 on SG
SW05001	South First Creek (old)	175,590.08	2,197,131.85	5,281.87 = TBM 5,278.58 = 0.00 on SG 5,278.91 = PZF
SW08003	South First Creek (new)	173,686.65	2,198,520.22	5,293.84 = TBM A 5,293.94 = TBM B 5,290.83 = PZF 5,290.82 = 0.00 on SG
SW11001	Peoria Interceptor	170,287.71	2,179,583.49	5,252.48 = TBM 5,250.28 = 3.33 on SG
SW11002	Havana Interceptor	170,992.86	2,178,854.75	5,261.49 = TBM 5,252.09 = 0.00 on SG
SW11003	Havana Pond	172,696.42	2,180,121.78	5,253.97 = TBM 5,244.08 = 0.00 on SG
SW12005	South Uvalda Interceptor	170,445.36	2,186,746.06	5,272.37 = TBM 5,274.40 = 3.33 on SG
SW12007	Highline Lateral	175,292.77	2,188,725.83	5,275.15 = TBM 5,275.10 = 3.33 on SG 5,272.63 = PZF
SW24001	Sewage Treatment Effluent	194,147.34	2,186,376.17	5,154.56 = PVC

Appendix A-1.1 Table A-1.1-1 (cont'd.)

Station #	Location	Northing	Easting	Elevation/GH
SW24002	N. First Creek (new)	195,311.93	2,187,575.26	5,146.52 = TBM A 5,146.01 = TBM B 5,141.75 = PZF 5,144.51 = 3.33 on SG
SW36001	Basin A	180,985.85	2,184,525.97	5,253.51 = TBM A 5,253.50 = TBM B 5,252.11 = 0.00 on SG 5,252.19 = PZF
SW37001	First Creek Off-post	199,013.30	2,180,816.71	5,108.99 = TBM 5,110.24 = 3.33 on SG 5107.43 = PZF Weir

SG = Staff Gage TBM = Temporary Bench Mark PZF = Point of Zero Flow

APPENDIX A-1.2

Station Survey Information

APPENDIX A-1.2

Cross-Section Survey Plots

Cross Sections were surveyed at the following stations:

North Uvalda (SW01001)
Peoria Interceptor (SW11001)
Havana Interceptor (SW11002)
South Uvalda (SW12005)
North First Creek (SW24002)

Two channel cross sections were surveyed below the structure, one cross section through the center of the structure, one cross section upstream of the structure through the existing staff gage and two additional cross sections were surveyed upstream of the staff gage. The maximum distance between adjacent cross sections was five channel widths.

One cross section was surveyed at Havana Interceptor along with upstream and downstream thalweg elevations for bed slope calculations. Four cross sections were surveyed at North Uvalda. Six cross sections were surveyed at Peoria Interceptor and South Uvalda. A total of five cross sections well surveyed at North First Creek.

Each cross section elevation is in feet mean sea level (MSL) and is tied to a vertical control (temporary bench mark - TBM) near each gage. All cross sections were surveyed from left bank to right bank looking in a downstream direction. Horizontal and vertical scales for plotting were selected independently for each station reach based on best visual representation of plots to actual site conditions. Cross-section plot number three and four for each station includes the staff gage elevations on the cross-section plot.

Plan view drawings were produced for each surveyed station. The plan views contain the following information:

Distance between cross secitons.

Location of the control structure.

Location of the stilling well.

Location of the staff gage.

Location of the TBM.

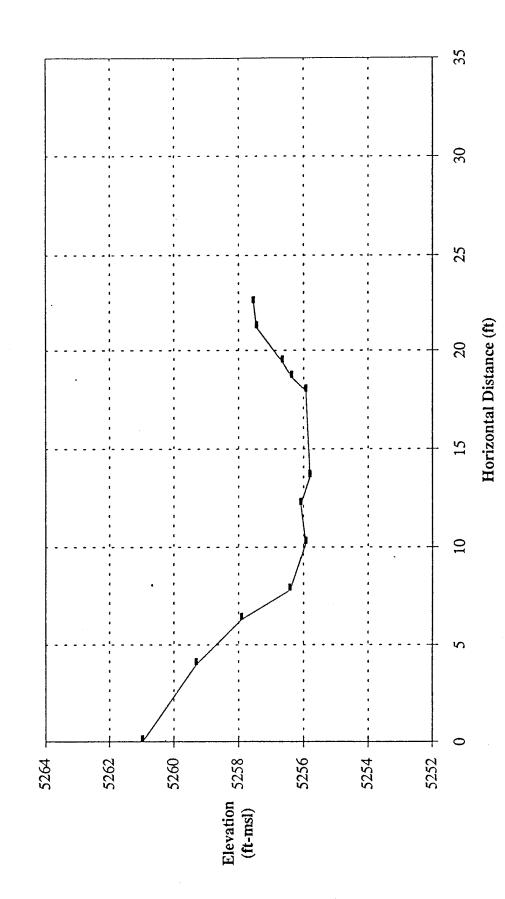
Direction of flow.

Average width of the channel.

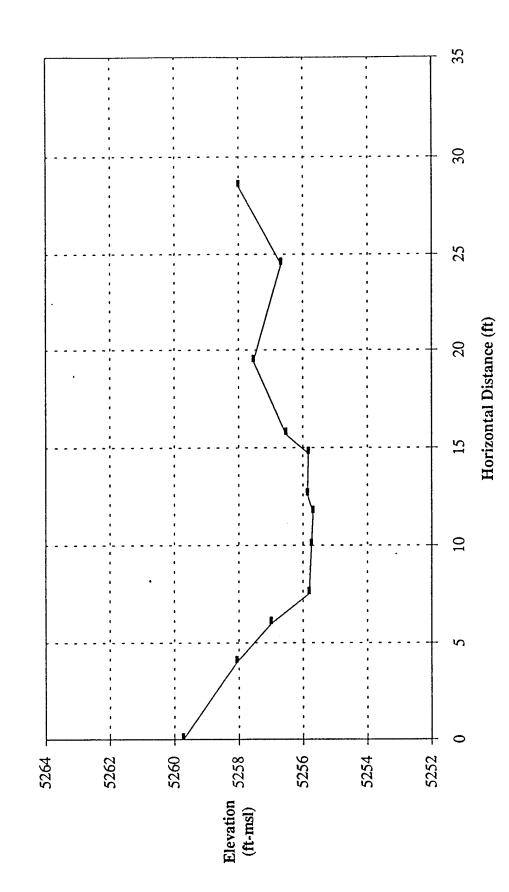
APPENDIX A-1.2.1

Cross Section Survey Plots

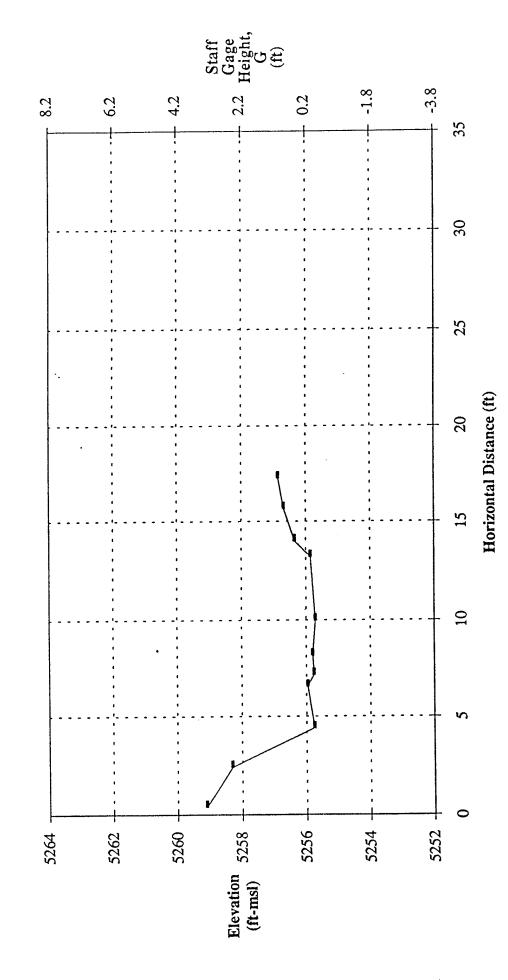
NORTH UVALDA (STATION SW01001) CROSS SECTION 1



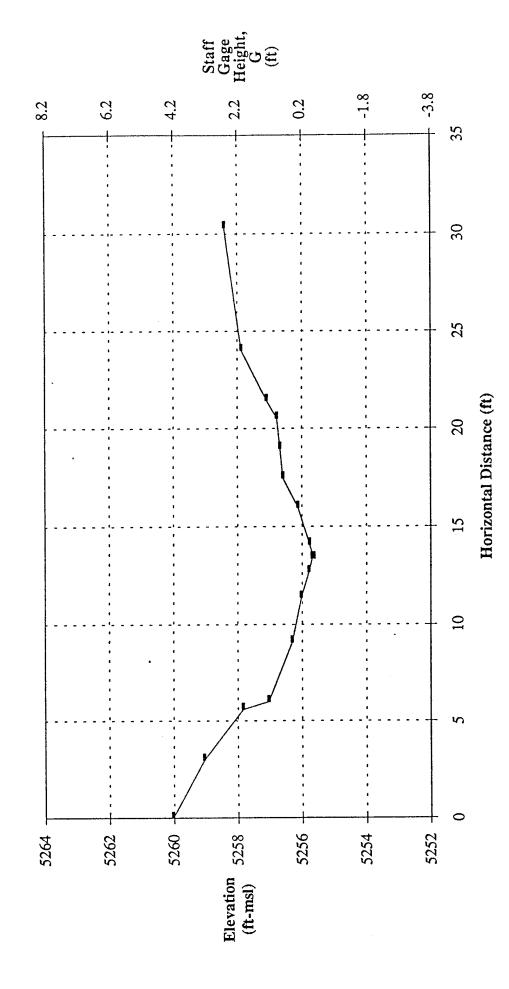
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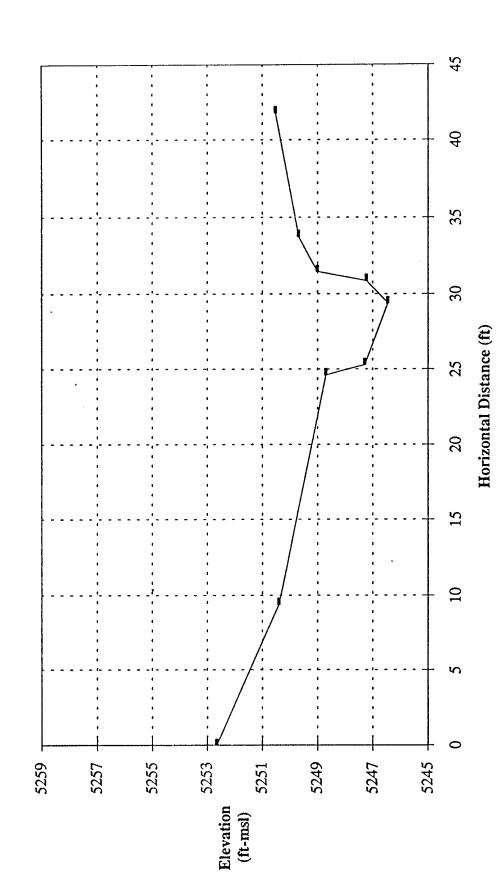
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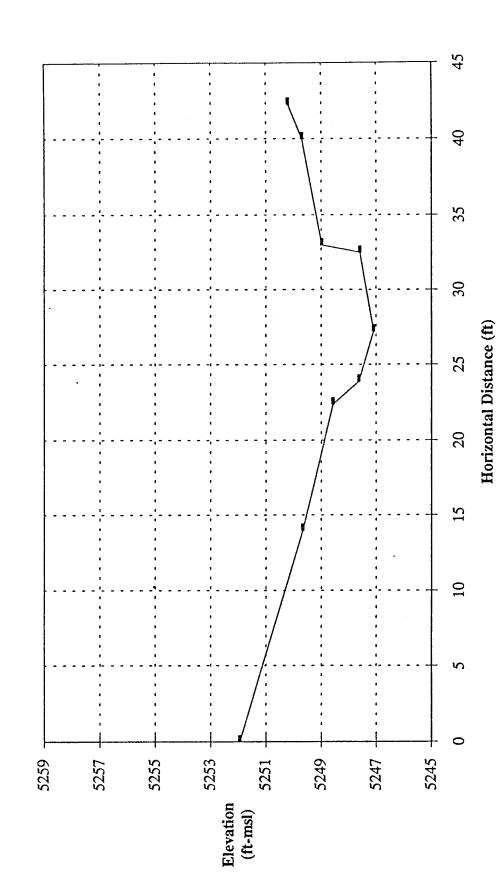
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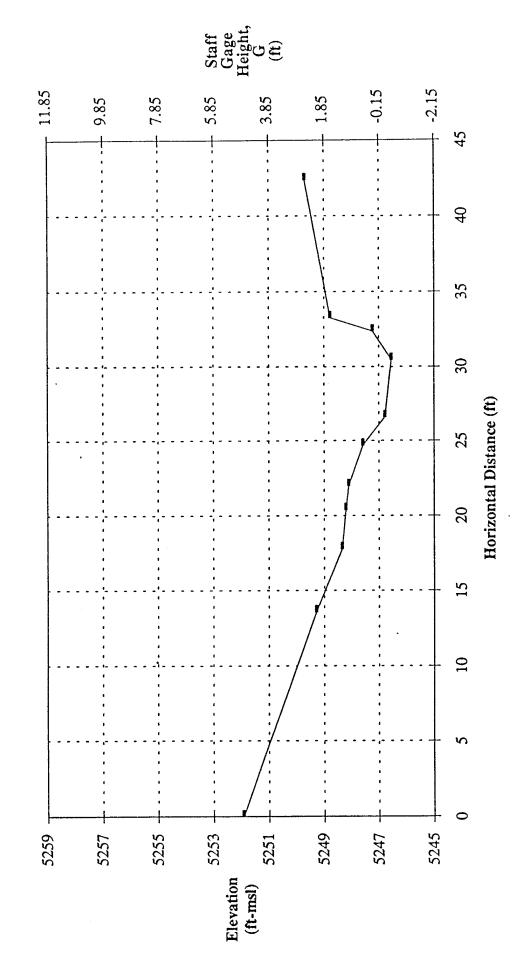
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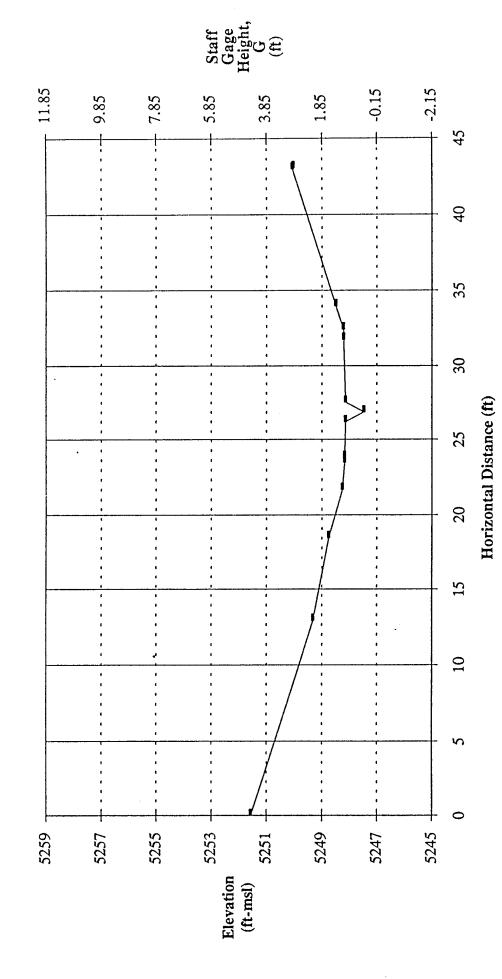
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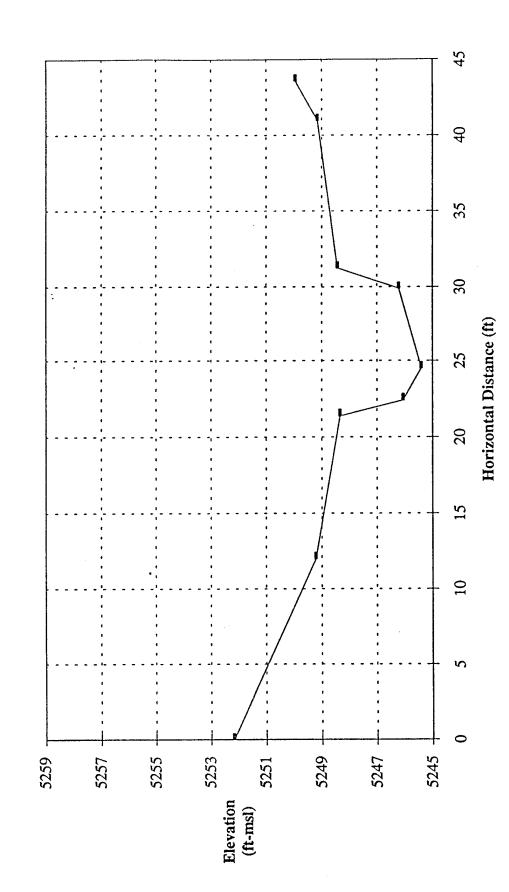
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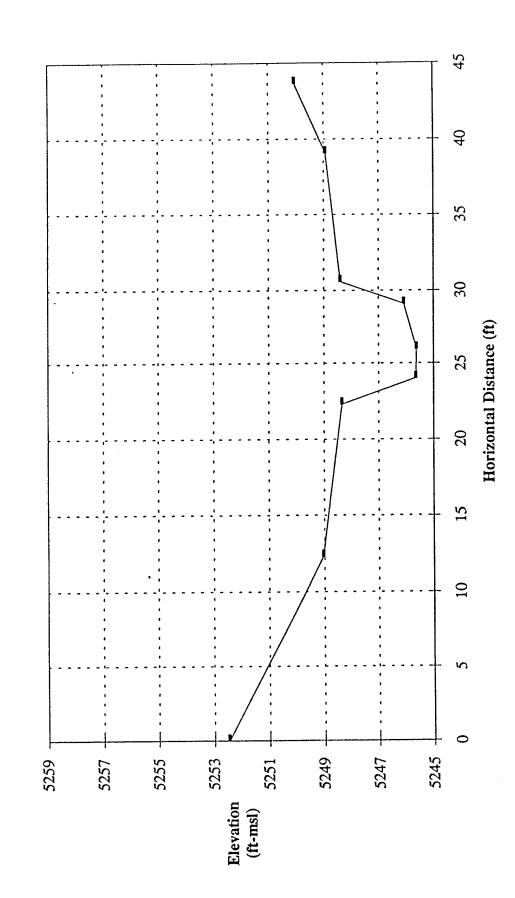
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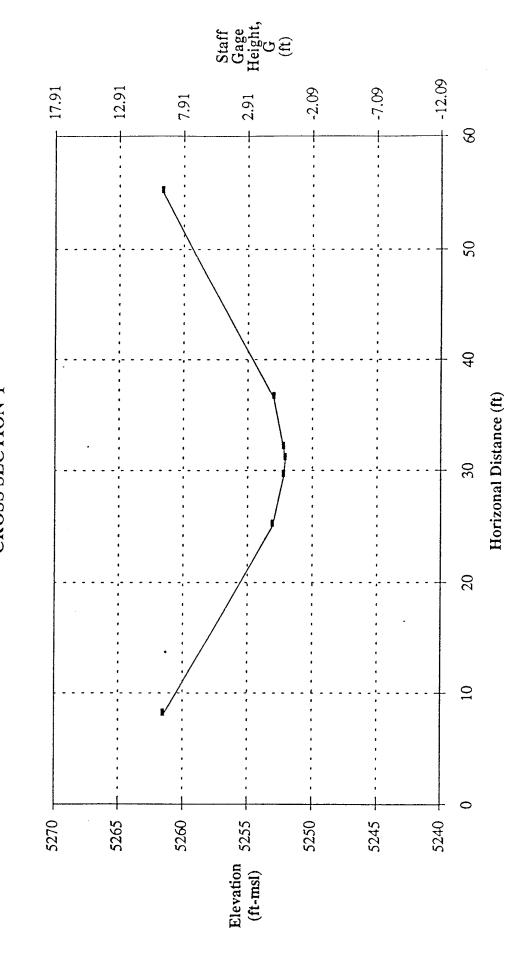
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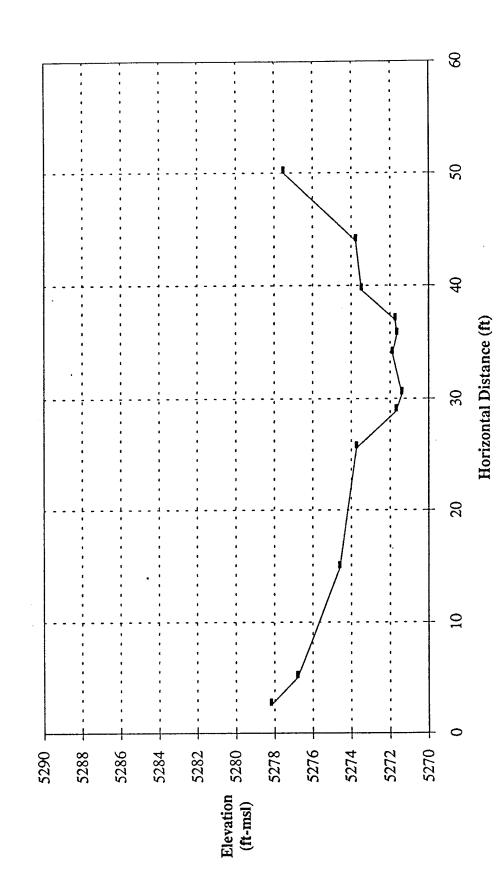
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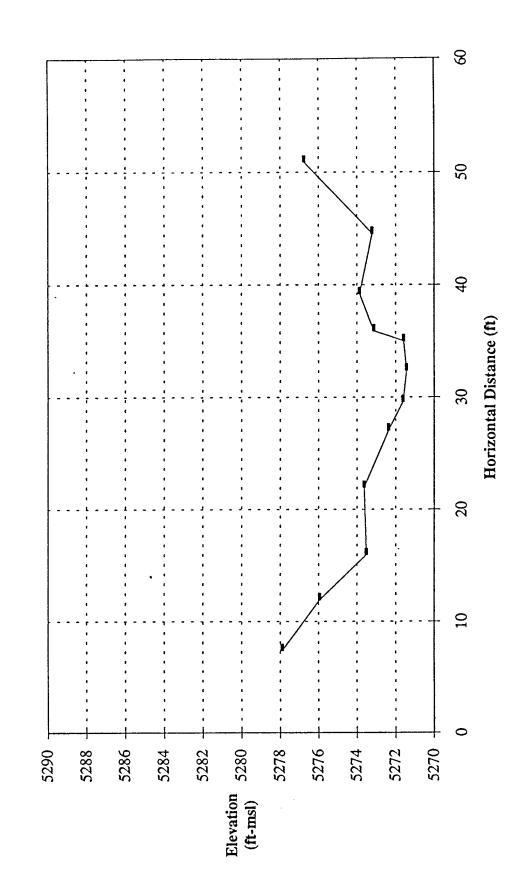
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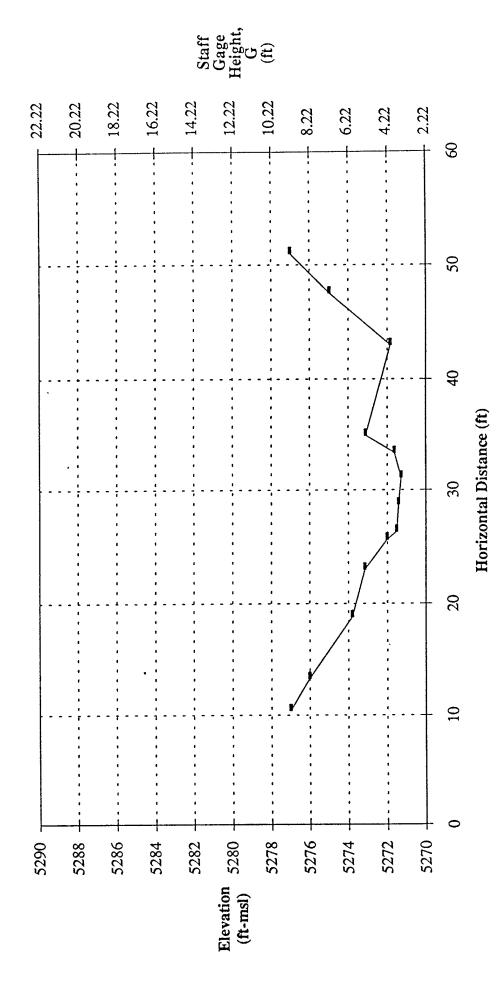
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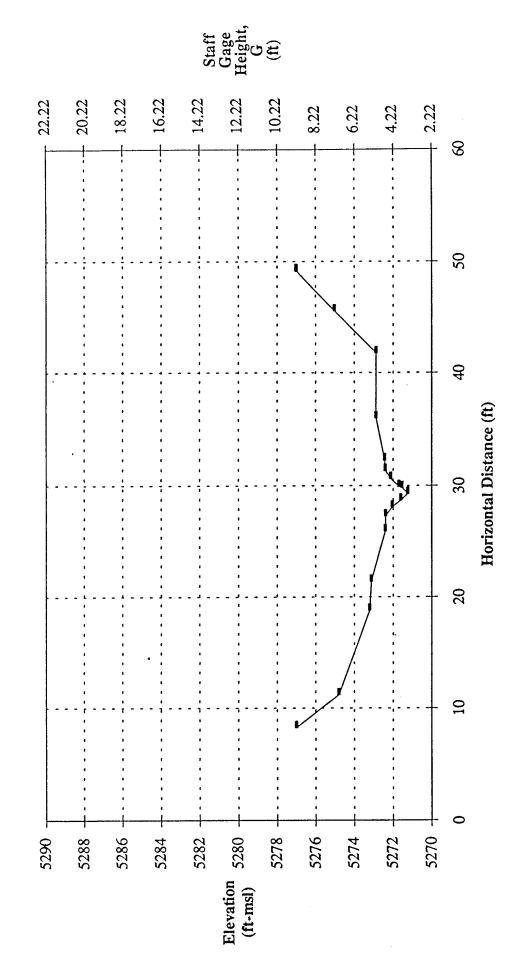
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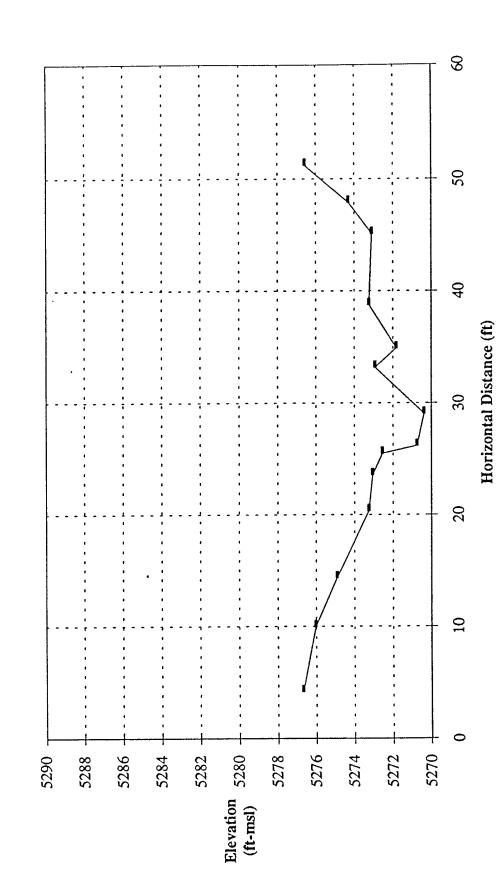
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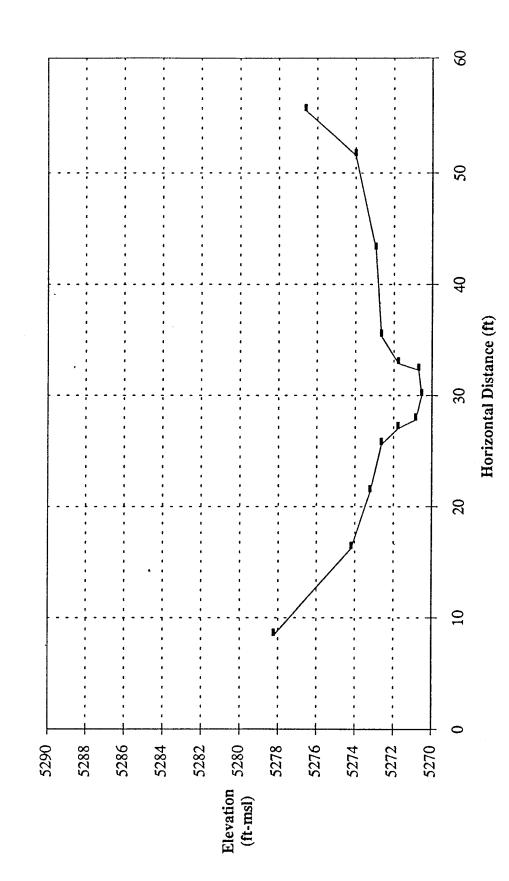
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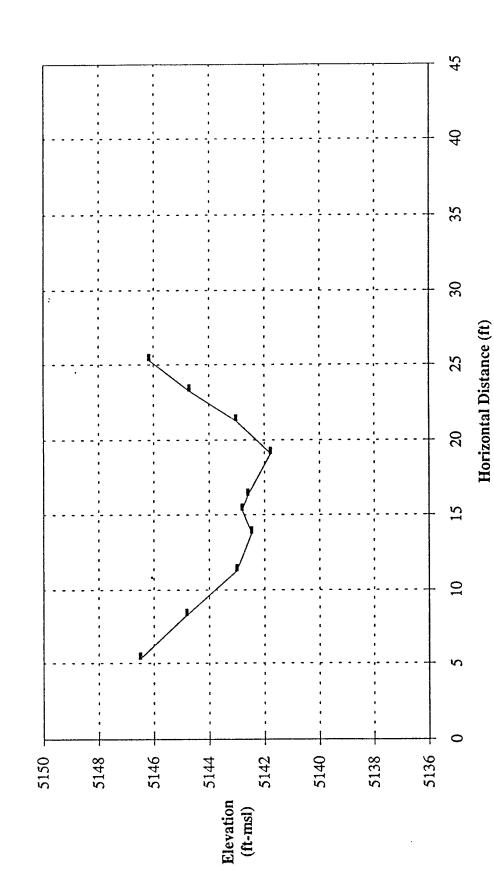
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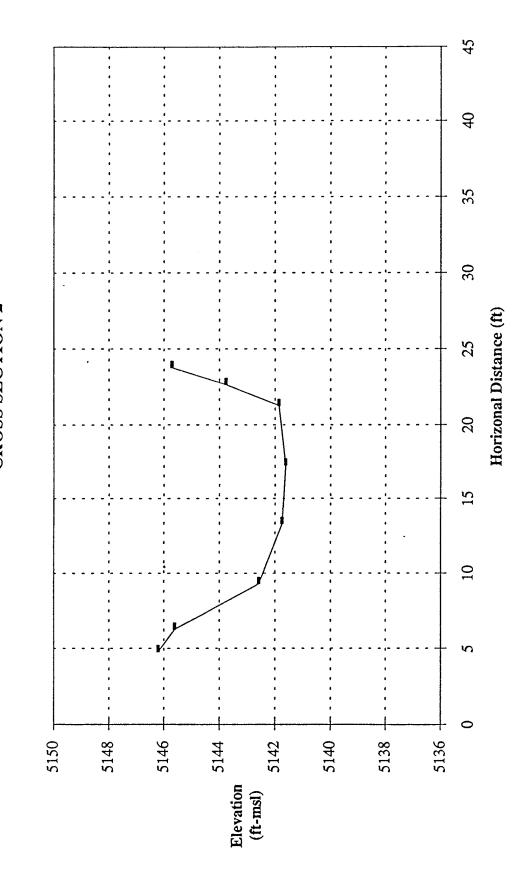
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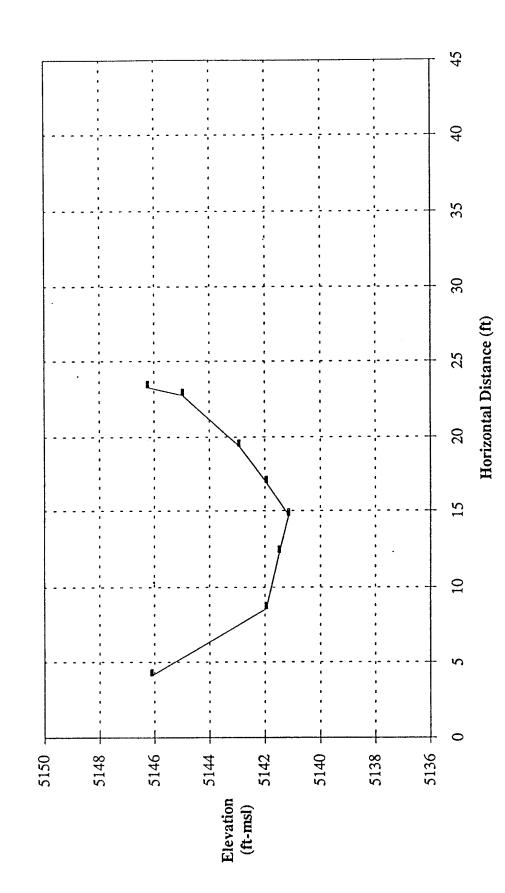
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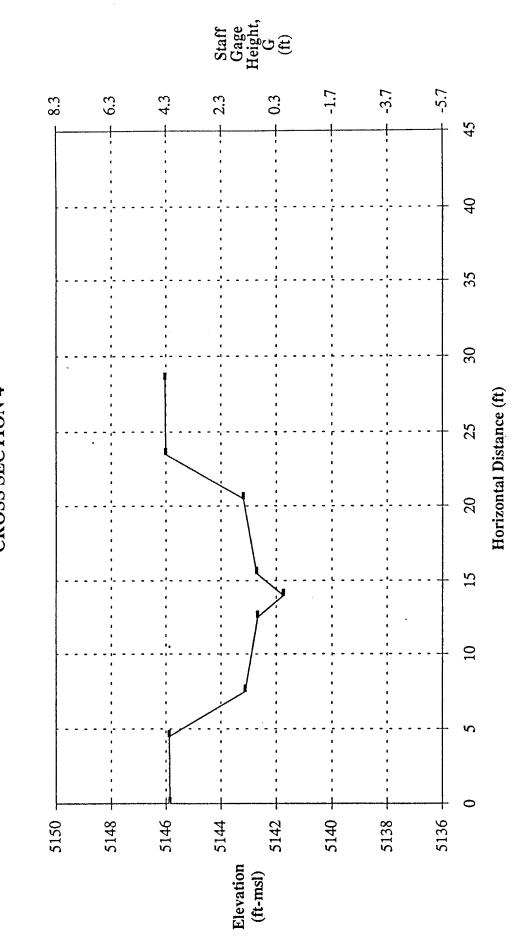
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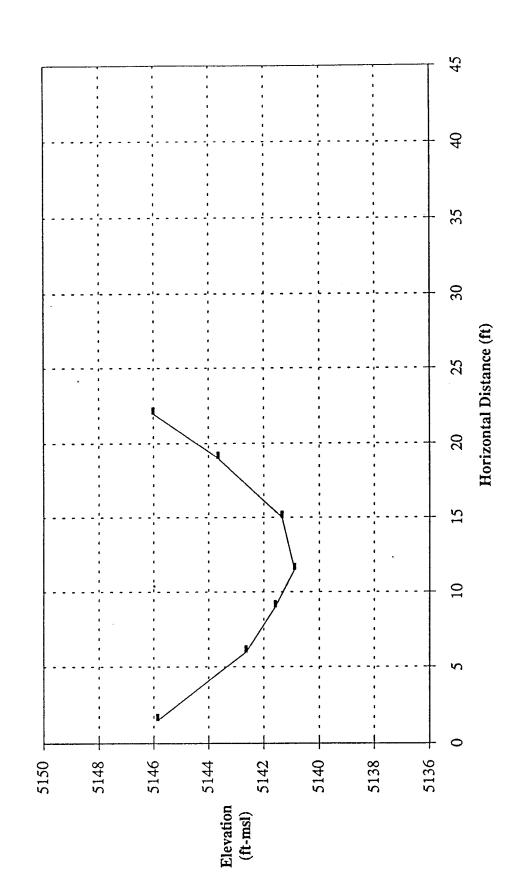
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NORTH FIRST CREEK (STATION SW24002) CROSS SECTION 4

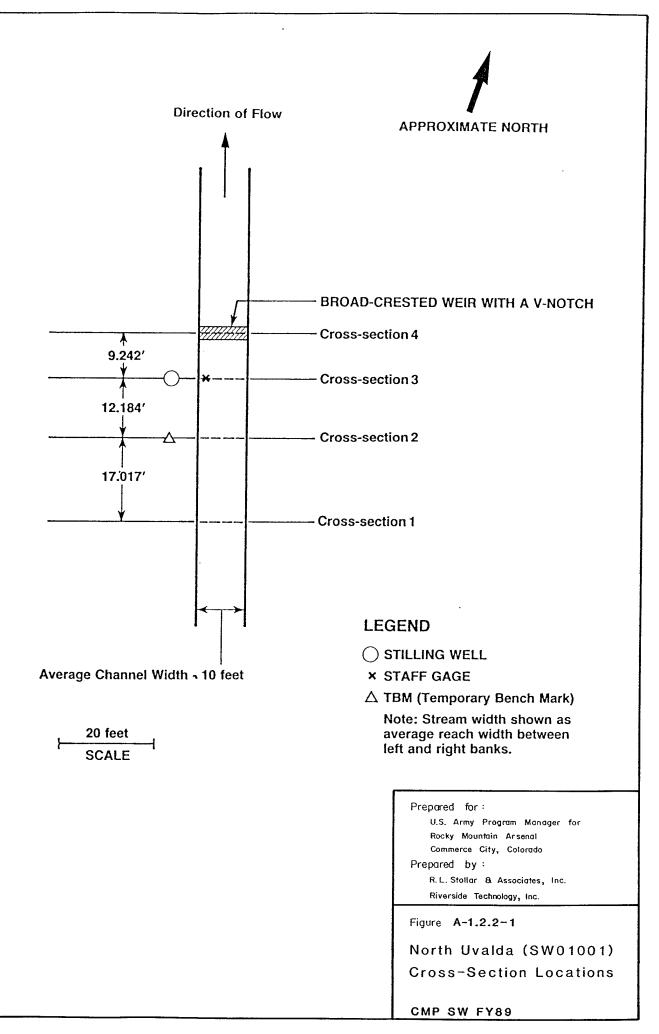


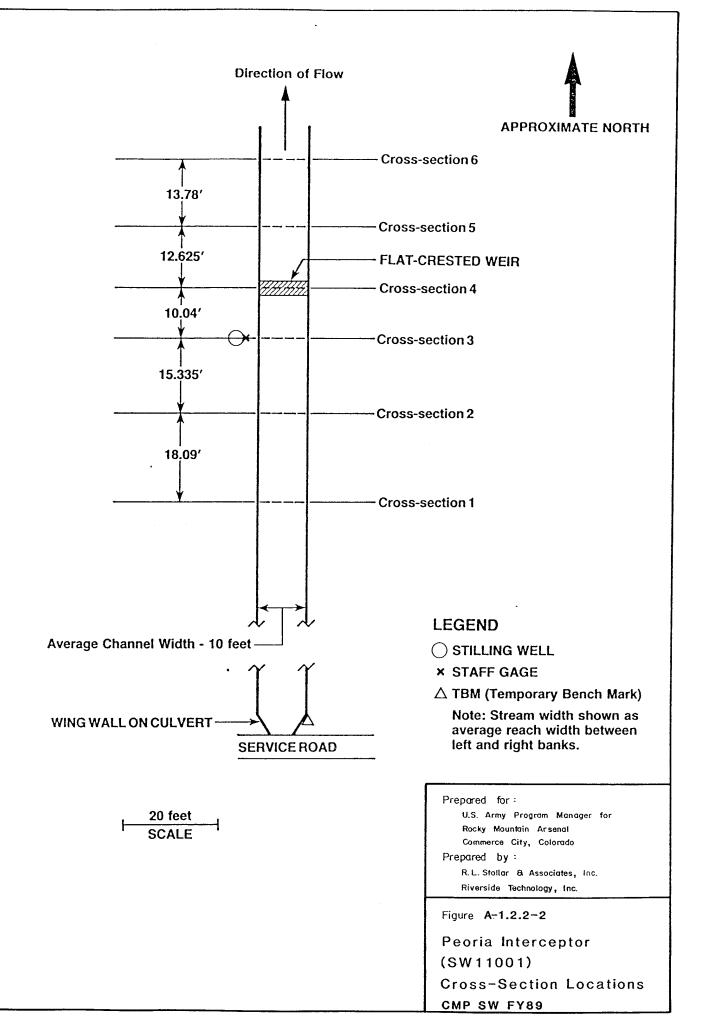
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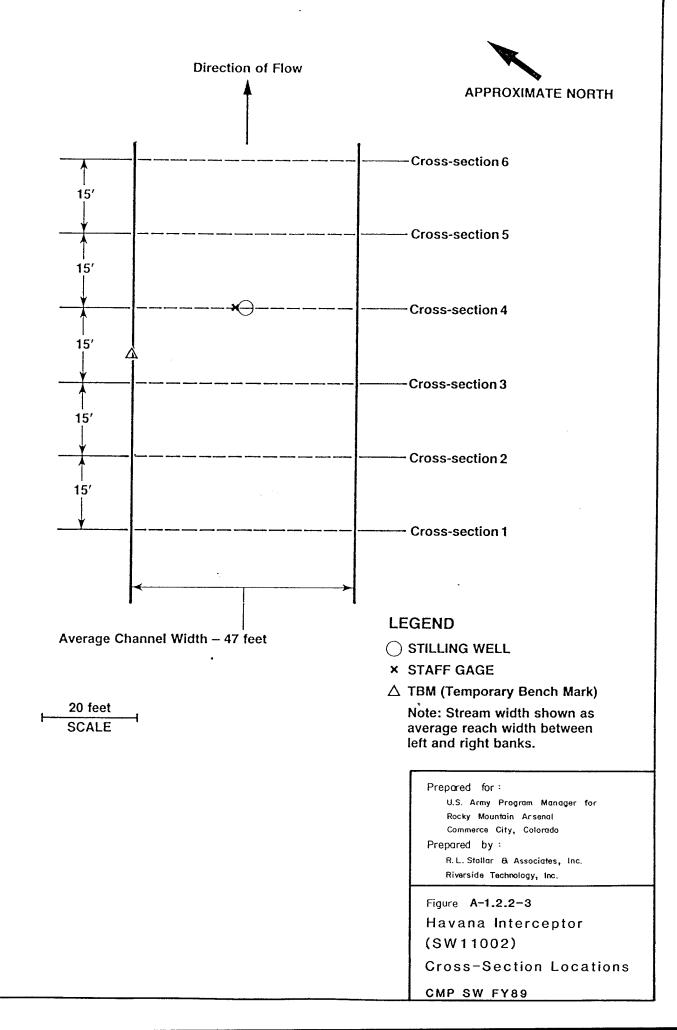


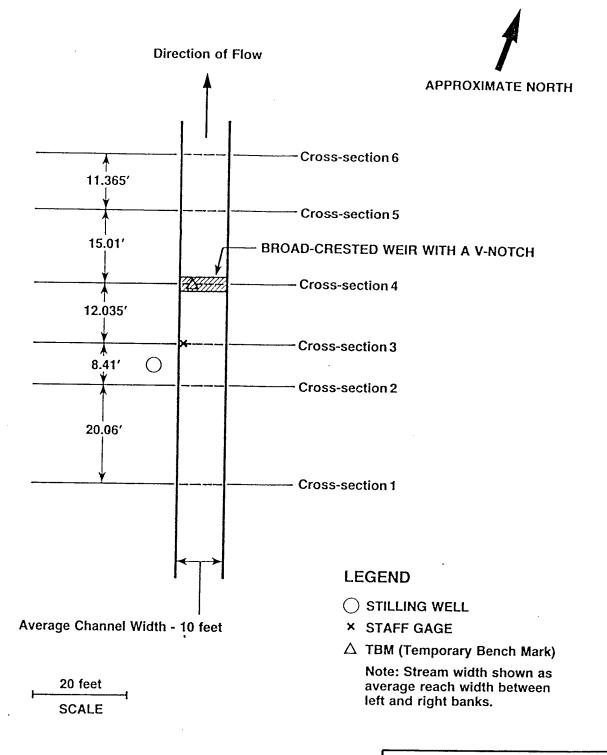
APPENDIX A-1.2.2

Monitoring Station Plan Views







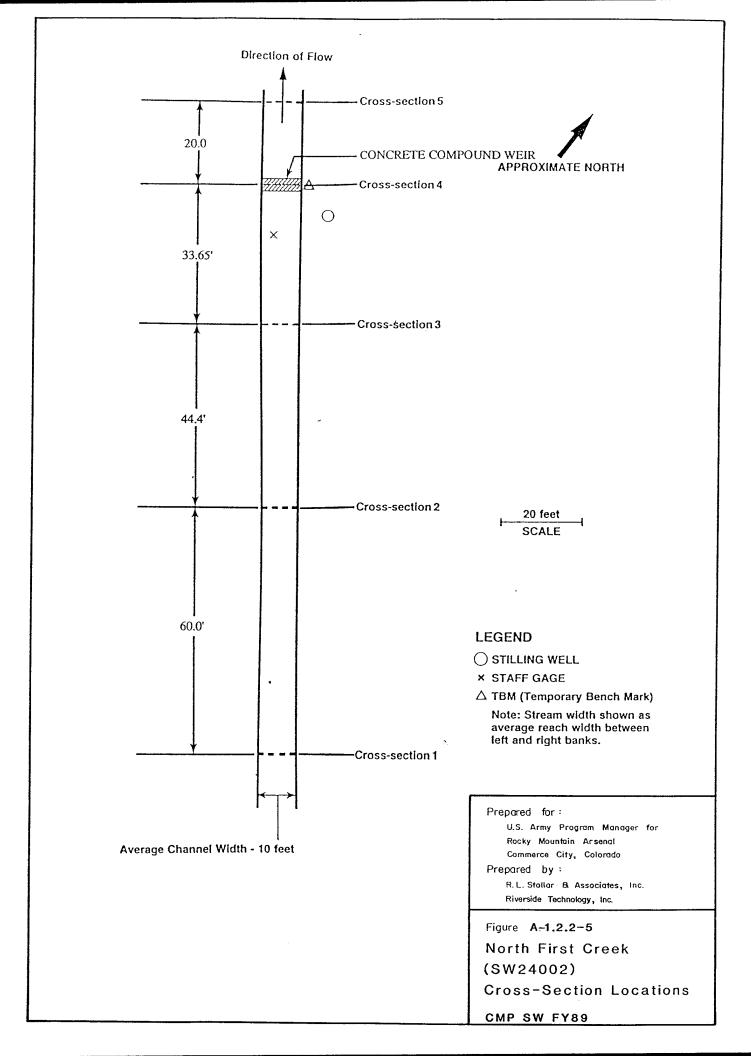


Prepared for:
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Riverside Technology, Inc.

Figure A-1.2.2-4

South Uvalda (SW 12005) Cross-Section Locations

CMP SW FY89



APPENDIX A-1.2.3

Cross Section Survey Data

Table A-1.2.3-1 North Uvalda (SW01001) Cross Section Survey Data

Horizontal		Horizontal	
Distance	Elevation	Distance	Elevation
(ft)	(ft-msl)	(ft)	(ft-msl)
Cross Section 1		Cross Se	ection 3
0.00	5260.980	0.40	5259.105
4.00	5259.310	2.40	5258.305
6.30	5257.915	4.40	5255.750
7.90	5256.425	6.60	5255.955
10.20	5255.925	7.20	5255.760
12.20	5256.090	8.20	5255.800
13.60	5255.805	10.00	5255.715
17.90	5255.925	13.20	5255.855
18.60	5256.370	14.00	5256.350
19.40	5256.655	15.70	5256.690
21.20	5257.445	17.30	5256.855
22.50	5257.550		
Cross Se	ection 2	Cross S	ection 4
0.00	5259.740	0.00	5260.040
4.00	5258.070	3.00	5259.055
6.00	5256.995	5.60	5257.840
7.50	5255.810	6.00	5257.040
10.00	5255.745	9.10	5256.315
11.70	5255.695	11.40	5256.025
12.60	5255.865	12.70	5255.790
14.70	5255.930	13.40	5255.695
15.70	5256.525	14.10	5255.775
19.40	5257.535	16.00	5256.125
24.50	5256.675	17.50	5256.585
28.50	5258.010	19.00	5256.675
	•	20.50	5256.775
		21.40	5257.095
		24.00	5257.880
		30.30	5258.400

Table A-1.2.3-2 Peoria Interceptor (SW11001) Cross Section Survey Data

Horizontal Distance (ft)	Elevation (ft-msl)	Horizontal Distance (ft)	Elevation (ft-msl)
Cross Se	Cross Section 1		ection 4
0.00	5252.665	0.00	5251.580
9.40	5250.400	12.90	5249.315
24.60	5248.695	18.50	5248.760
25.30	5247.295	21.70	5248.260
29.40	5246.470	23.50	5248.180
30.90	5247.235	23.80	5248.480
31.50	5249.005	26.20	5248.150
33.80	5249.690	26.87	5247.480
41.80	5250.525	27.54	5248.150
41.00	3230.323	31.80	5248.210
		32.50	5248.220
		34.00	5248.500
		43.00	5250.070
		43.10	5250.030
		45.10	3230.030
Cross Se	ction 2	Cross Section 5	
0.00	5251.955	0.00	5252.185
14.00	5249.655	12.00	5249.215
22.40	5248.570	21.40	5248.345
23.90	5247.630	22.40	5246.060
23.90 27.20		24.50	5245.410
	5247.095	24.30 29.90	5246.225
32.50	5247.590	31.30	5248.435
33.00	5248.970		
40.00	5249.700	41.00	5249.155
42.30	5250.205	43.60	5249.950
Cross Se	Cross Section 3		ection 6
0.00	5251.935	0.00	5252.480
13.60	5231.933	12.30	5249.045
	5249.290 5248.355	22.30	5248.350
17.80		24.00	5245.625
20.40	5248.215		
22.00	5248.115	26.00	5245.625 5246.085
24.70	5247.590	29.10	5246.085
26.60	5246.790	29.10	5246.085
30.50	5246.555	39.10	5248.935
32.40	5247.235	43.70	5250.055
33.30	5248.780		
42.40	5249.695		

Table A-1.2.3-3 Havana Interceptor (SW11002) Cross Section Survey Data

Horizontal Distance (ft)	Elevation (ft-msl)	
8.00	5261.540	
25.00	5253.075	
29.50	5252.215	
31.00	5252.090	
32.00	5252.220	
36.50	5252.975	
55.00	5261.645	

Table A-1.2.3-4

South Uvalda (SW12005) Cross Section Survey Data

Horizontal		Horizontal	
Distance (ft)	Elevation (ft-msl)	Distance (ft)	Elevation (ft-msl)
Cross Section 1		Cross Section 3	
2.50	5278.170	10.42	5277.000
5.00	5276.790	13.33	5276.020
14.80	5274.610	18.83	5273.810
25.60	5273.740	23.03	5273.170
28.90	5271.680	25.63	5272.005
30.40	5271.380	26.33	5271.515
33.90	5271.885	28.73	5271.425
35.60	5271.730	31.13	5271.285
36.90	5271.730	33.33	5271.635
39.60	5273.470	34.93	5273.105
44.00	5273,770	43.03	5271.845
50.00	5277.520	47.53	5274.990
		51.23	5277.130
Cross Se	ection 2	Cross Section 4	
7.42	5277.890	6.02	5277.615
11.92	5275.955	11.22	5274.810
15.92	5273.515	18.82	5273.210
22.02	5273.635	21.42	5273.135
27.12	5272.370	25.92	5272.400
29.62	5271.615	27.32	5272.400
32.42	5271.440	28.12	5272.040
35.02	5271.580	28.72	5271.600
35.92	5273.120	29.32	5271.240
39.22	5273.870	29.82	5271.535
44.52	5273.220	29.92	5271.695
50.92	5276.760	30.62	5272.130
		31.32	5272.405
		32.22	5272.435
		35.92	5272.885
		41.82	5272.880
		45.62	5275.040
		49.22	5277.030

Table A-1.2.3-4 South Uvalda (SW12005) Cross Section Survey Data (continued)

Horizontal Distance (ft)	Elevation (ft-msl)	Horizontal Distance (ft)	Elevation (ft-msl)
Cross S	ection 5	Cross S	ection 6
4.17	5276.700	8.42	5278.230
9.97	5276.040	16.22	5274.190
14.37	5274.915	21,42	5273.205
20.37	5273.265	25.62	5272.640
23.57	5273.070	27.02	5271.770
25.47	5272.560	27.82	5270.840
26.17	5270.740	30.02	5270.525
29.07	5270.385	32.32	5270.690
33.17	5272.930	32.92	5271.770
34.87	5271.835	35.42	5272.660
38.77	5273.245	43.22	5272.950
45.17	5273.100	51.52	5273.995
47.97	5274.305	55.42	5276.615
51.17	5276.580		

Table A-1.2.3-5

North First Creek (SW24002) Cross Section Survey Data

Horizontal Distance (ft)	Elevation (ft-msl)	Horizontal Distance (ft)	Elevation (ft-msl)
Cross S	Cross Section 1		ection 4
5.30 8.30 11.30 13.80 15.30 16.30 19.10 21.30	5146.500 5144.820 5143.010 5142.820 5142.470 5142.610 5141.780 5143.040	0.00 4.50 7.50 12.50 14.00 15.50 20.50 23.50 28.50	5145.860 5145.885 5143.130 5142.680 5141.750 5142.710 5143.200 5146.010
25.30	23.30 5144.720 25.30 5146.160 <u>Cross Section 2</u>		5146.040 ection 5
4.80 6.30 9.30 13.30 17.30 21.30 22.70 23.80	5146.210 5146.610 5142.590 5141.750 5141.620 5141.860 5143.770 5145.710	1.50 6.00 9.00 11.50 15.00 19.00 22.00	5145.870 5142.640 5141.590 5140.900 5141.340 5143.660 5146.020
Cross S	Cross Section 3		
4.10 8.60 12.30 12.30 16.90 19.40 22.80 23.30	4146.110 5141.950 5141.480 5141.150 5141.950 5142.935 5144.970 5146.230		

APPENDIX A-1.2.4

Channel Reach Survey Procedure

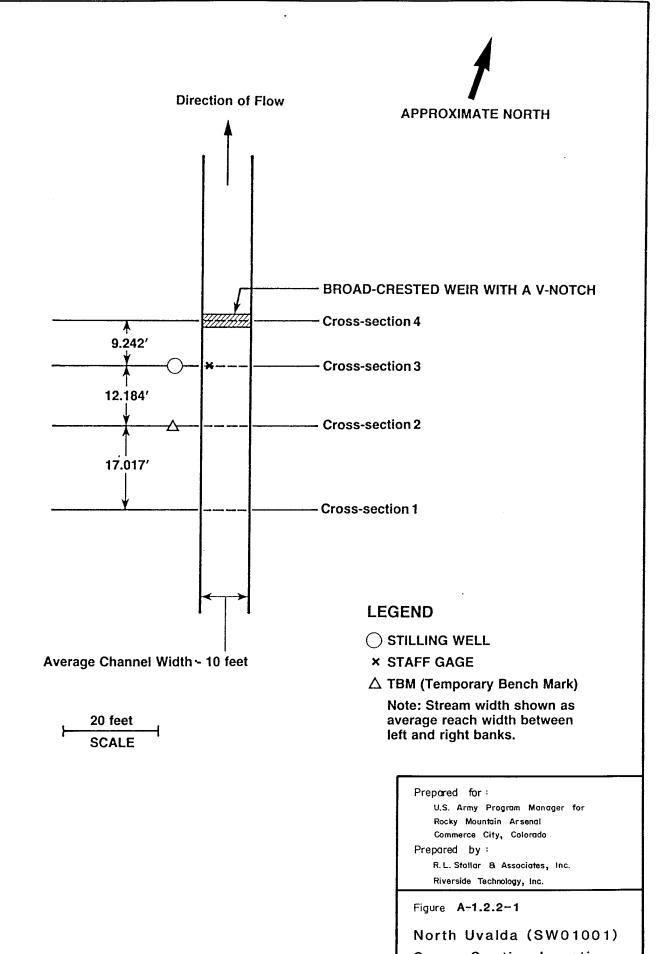
APPENDIX A-1.2.4 CHANNEL REACH SURVEYS

Vertical control was established by referencing to an existing temporary bench mark (TBM) located at or near each structure. Each TBM is permanently secured such that additional or future surveys can be referenced to the same elevation. The need to do additional surveying may arise as a result of flooding which could cause changes in channel geometry, from aggredation or degradation of the stream channel bottom as a result of increased or decrease sediment transport, and from modifications or changes in the control structure, staff location or staff elevation.

Each stream cross section was referenced either to the TBM or an established pin at the nearest upstream or downstream cross section to maintain vertical control. All rod readings were recorded to the nearest 0.005 feet. For each surveying instrument location, a backsight and foresight to established pins was recorded. All level loops were closed on the original TBM at each location, with an allowable vertical closure error not-to-exceed 0.01 feet. An end-to-end test or "peg test" was conducted on the surveying instrument each day prior to use to ensure instrument accuracy.

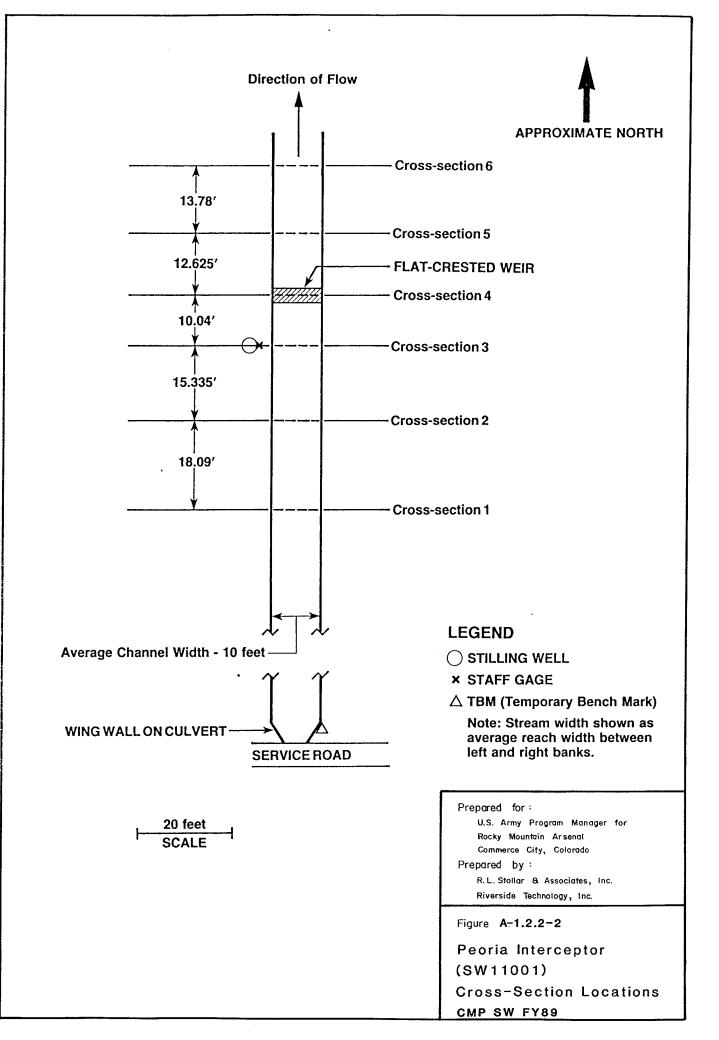
Horizontal control was established by driving 5/8-inch rebar stakes (pins) at the endpoints of each cross section. The pins serve as reference locations for each cross section and may be used for future surveys, if required. Each pin was tagged with aluminum tags etched with the station identification, pin identification and date. Pins were positioned on both sides of the stream channel perpendicular to flow lines in the stream. The location of the pins is high enough such that a wide range of high flows will be contained within the surveyed cross sections. Each pin was hammered into the ground approximately 1.5 feet. The remaining 0.5 feet was painted orange and tagged with orange surveyor's flagging for ease of locating in the future. For step-backwater modeling purposes, baseline and azimuth measurements were not required. Since all cross sections were staked and identified, horizontal control with reference to magnetic north can easily be obtained by additional surveys.

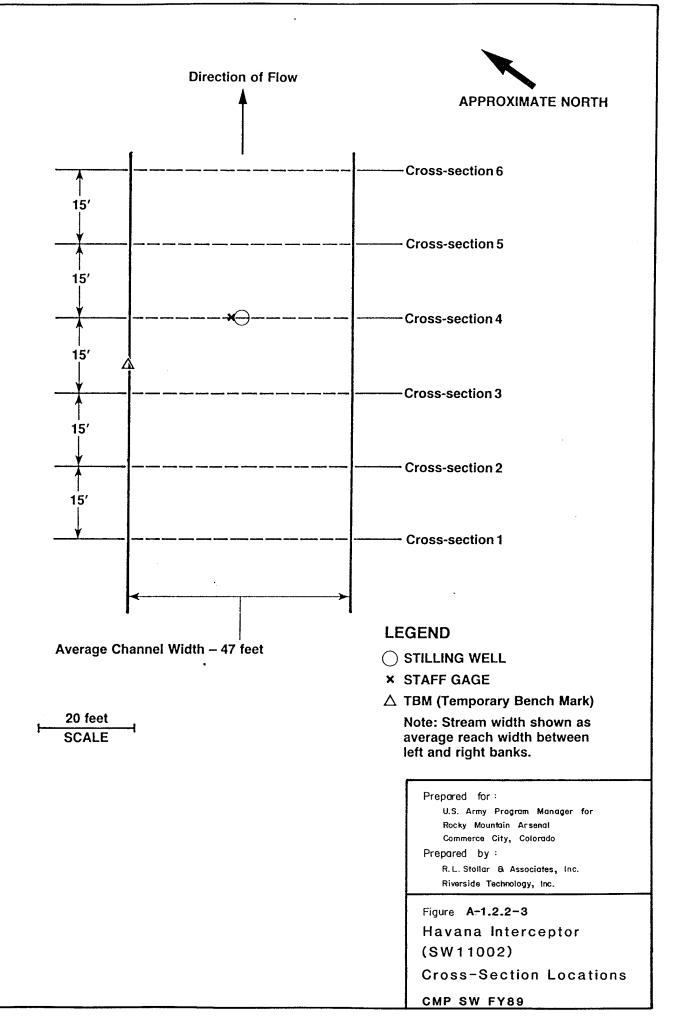
All cross sections were surveyed from left to right looking in a downstream direction. Horizontal stations were determined to the nearest 0.1 feet using a cloth tape stretched between the pins. Horizontal stationing was determined for all slope breaks along each cross section, for the left and right overbank reaches, left and right channel banks, left and right edge of water and for the thalweg of each cross section. Additionally, the water surface elevation at each cross section were determined to compute the energy grade of a particular reach.

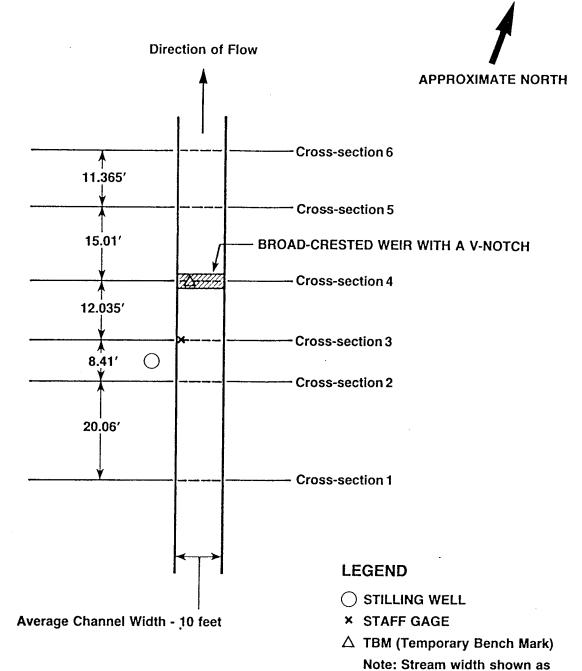


Cross-Section Locations

CMP SW FY89







20 feet

SCALE

Prepared for:

U.S. Army Program Manager for
Rocky Mountain Arsenat
Commerce City, Colorado

Prepared by:

R.I. Stollar, A. Associates, Inc.

R.L. Stollar & Associates, Inc. Riverside Technology, Inc.

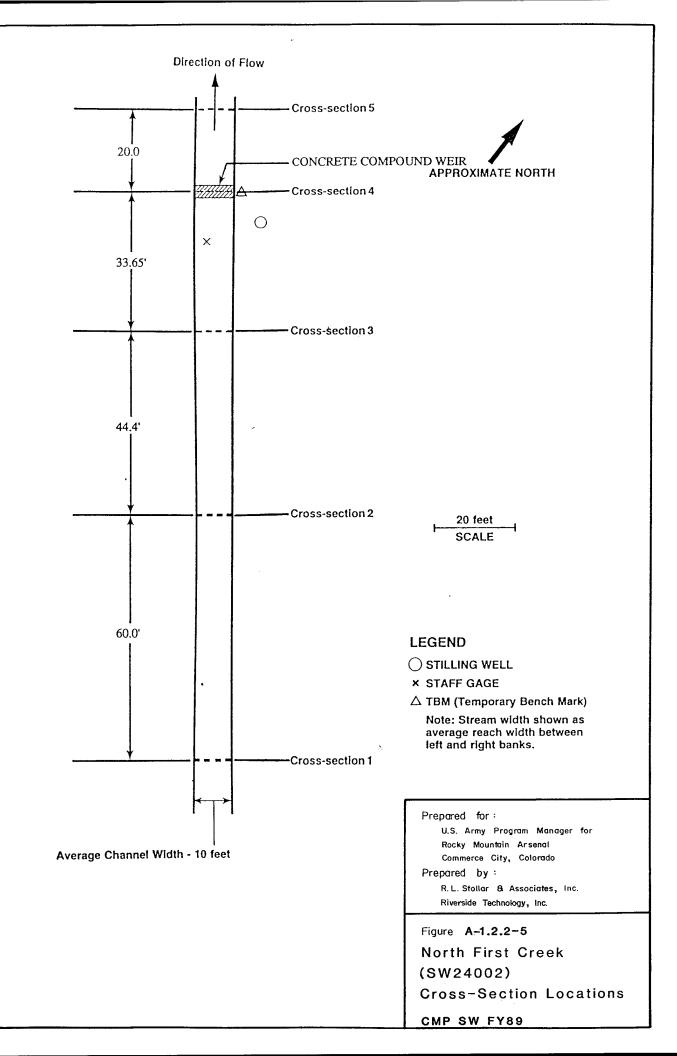
Figure **A-1.2.2-4**

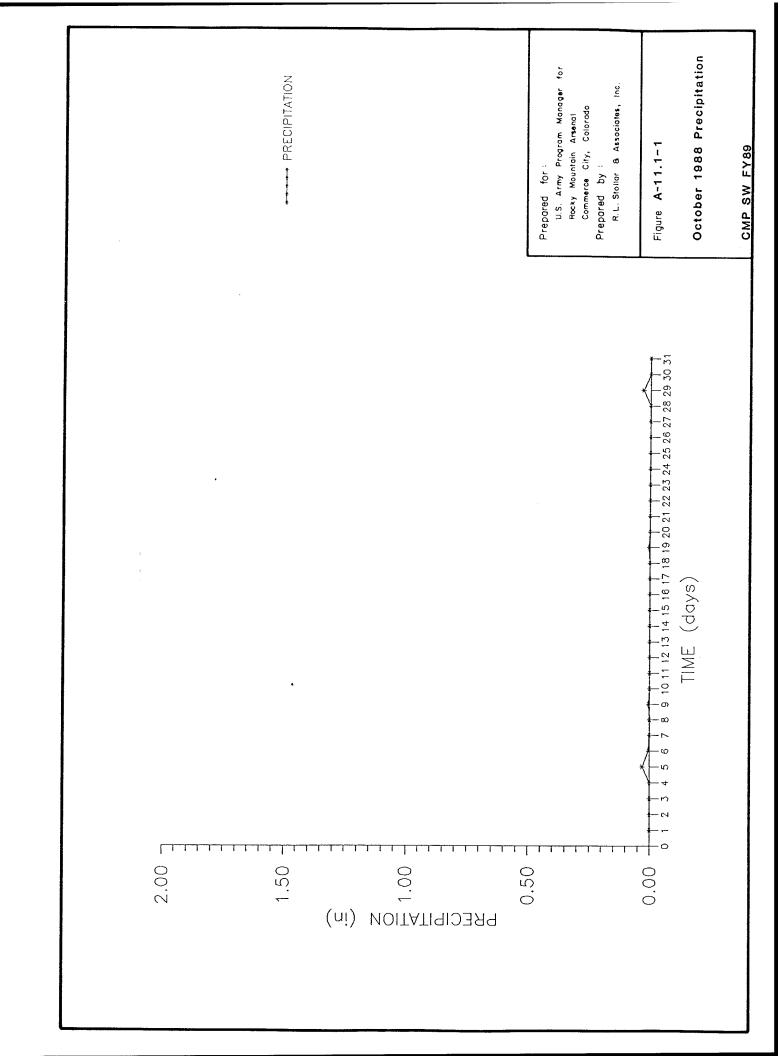
average reach width between

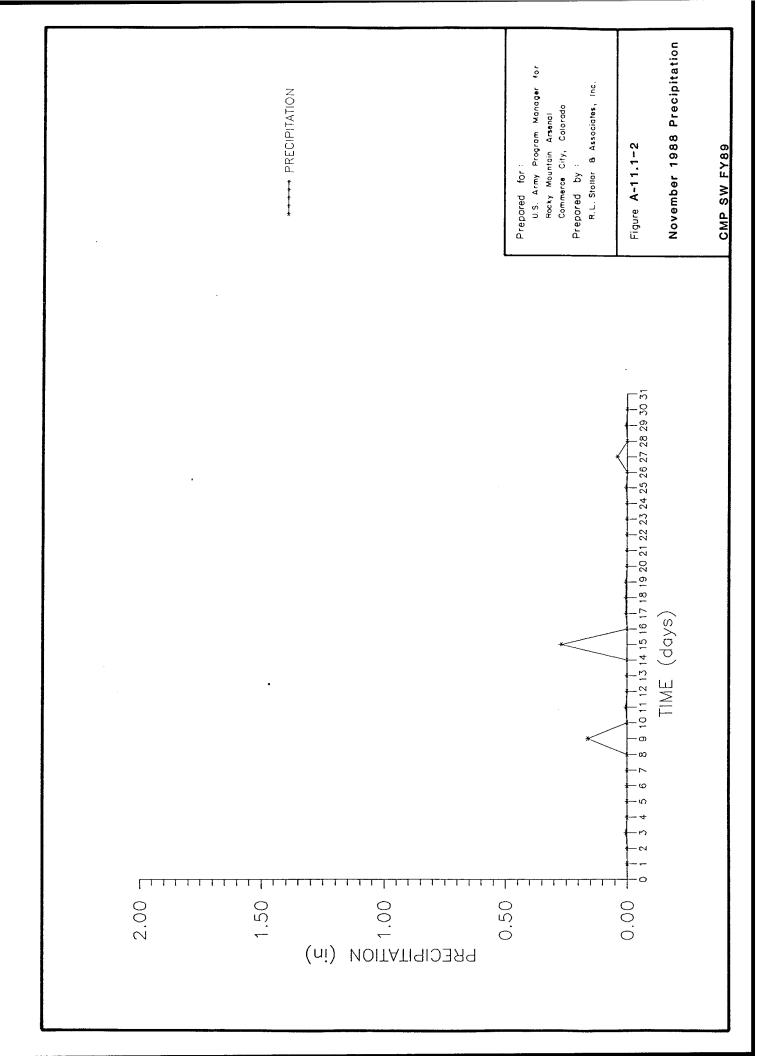
left and right banks.

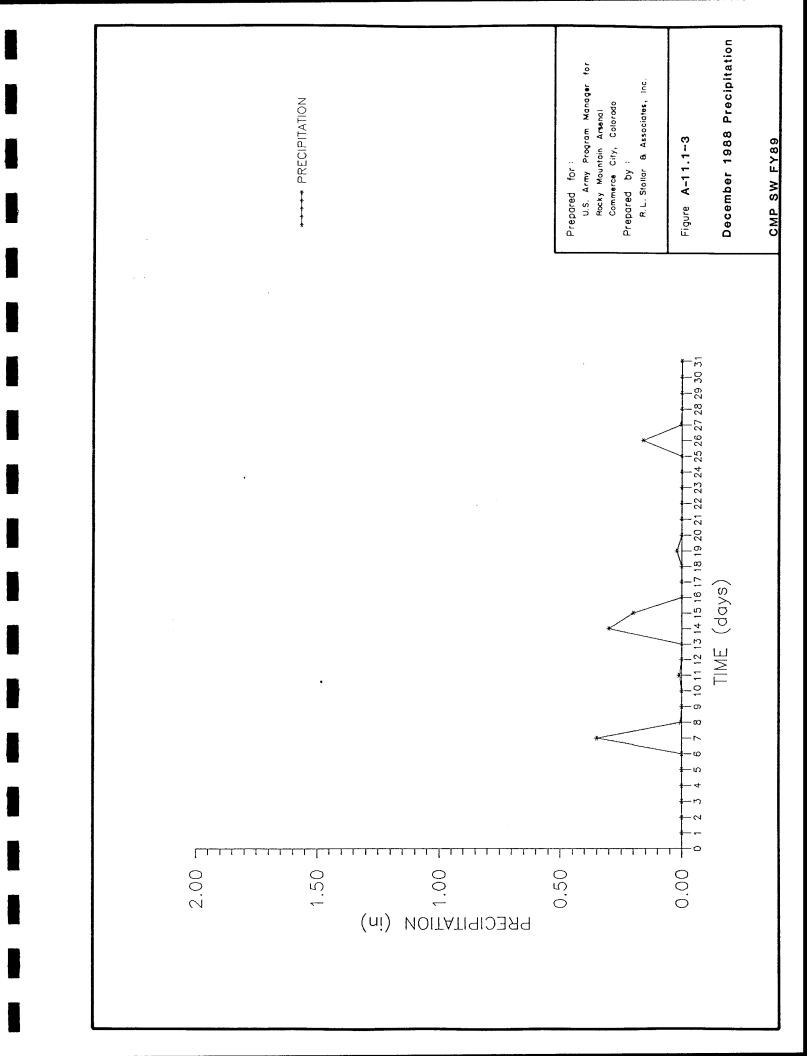
South Uvalda (SW12005) Cross-Section Locations

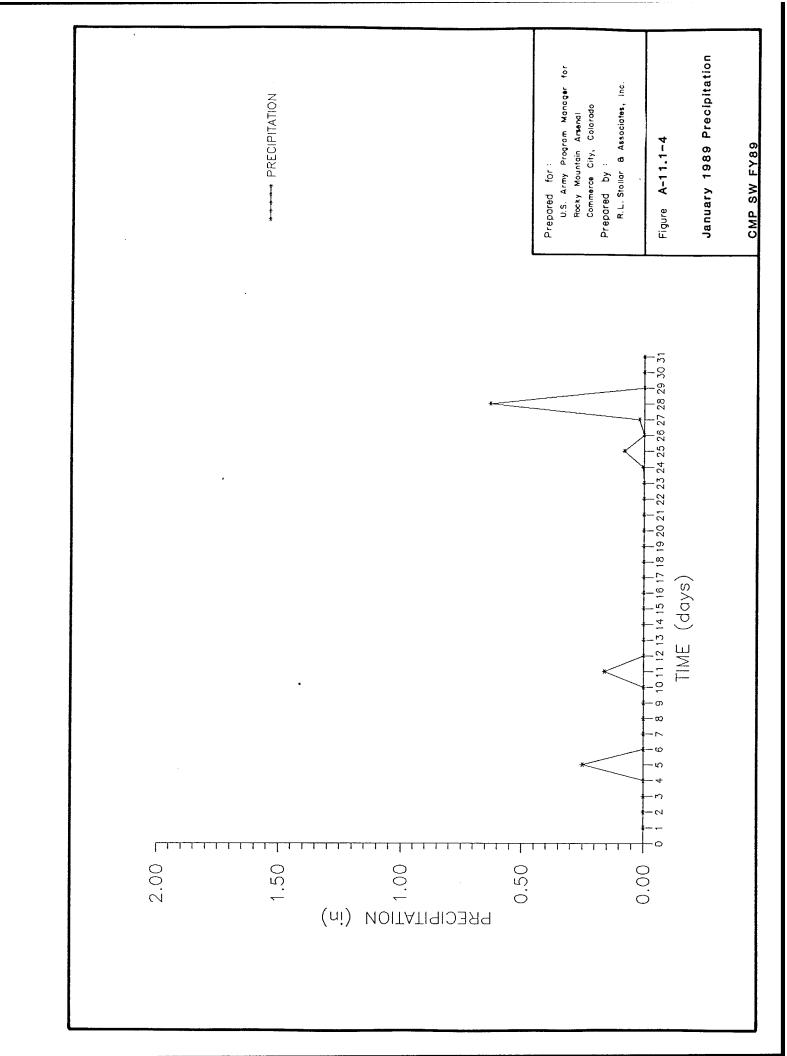
CMP SW FY89

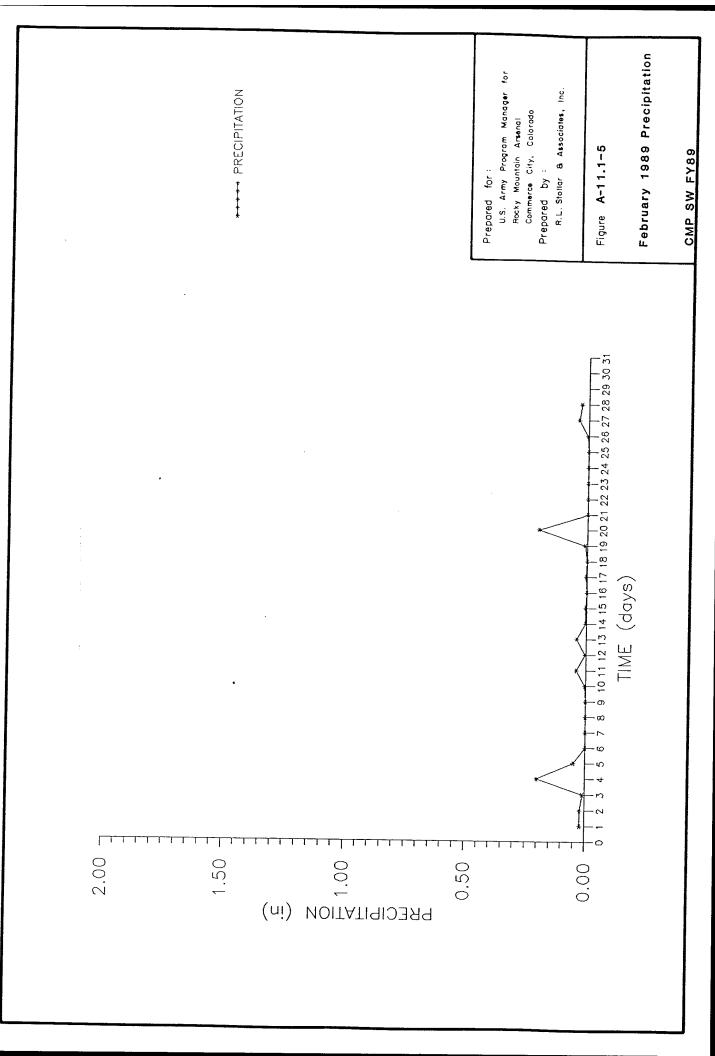


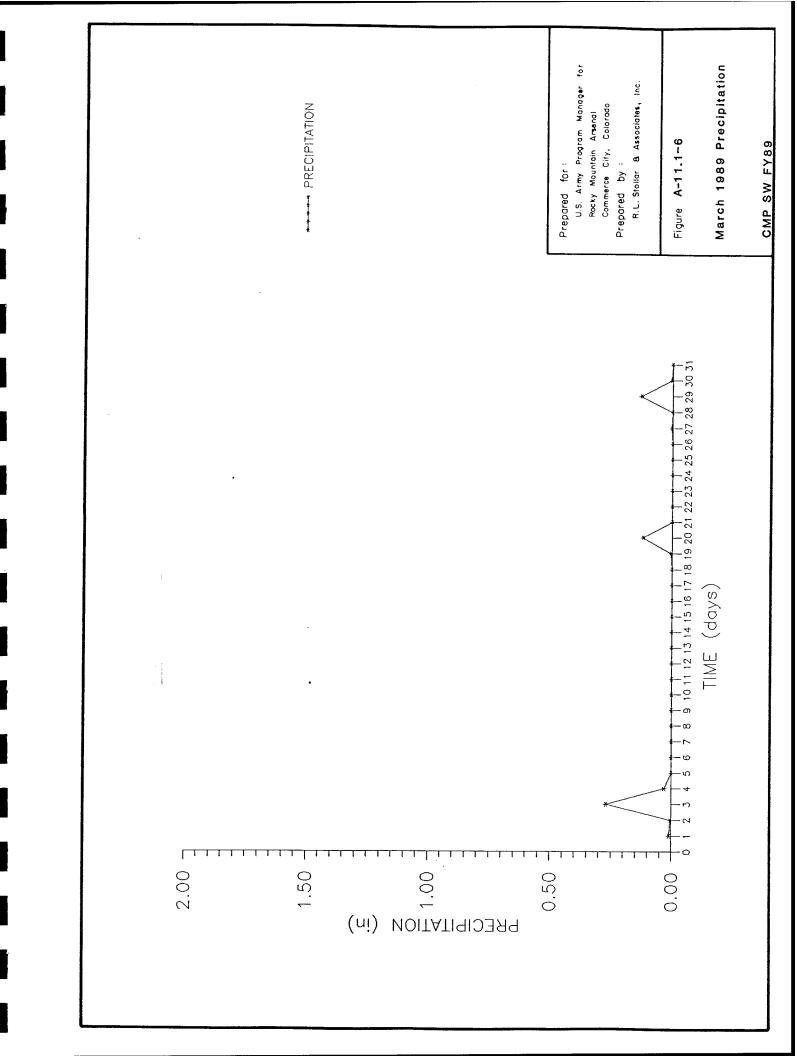


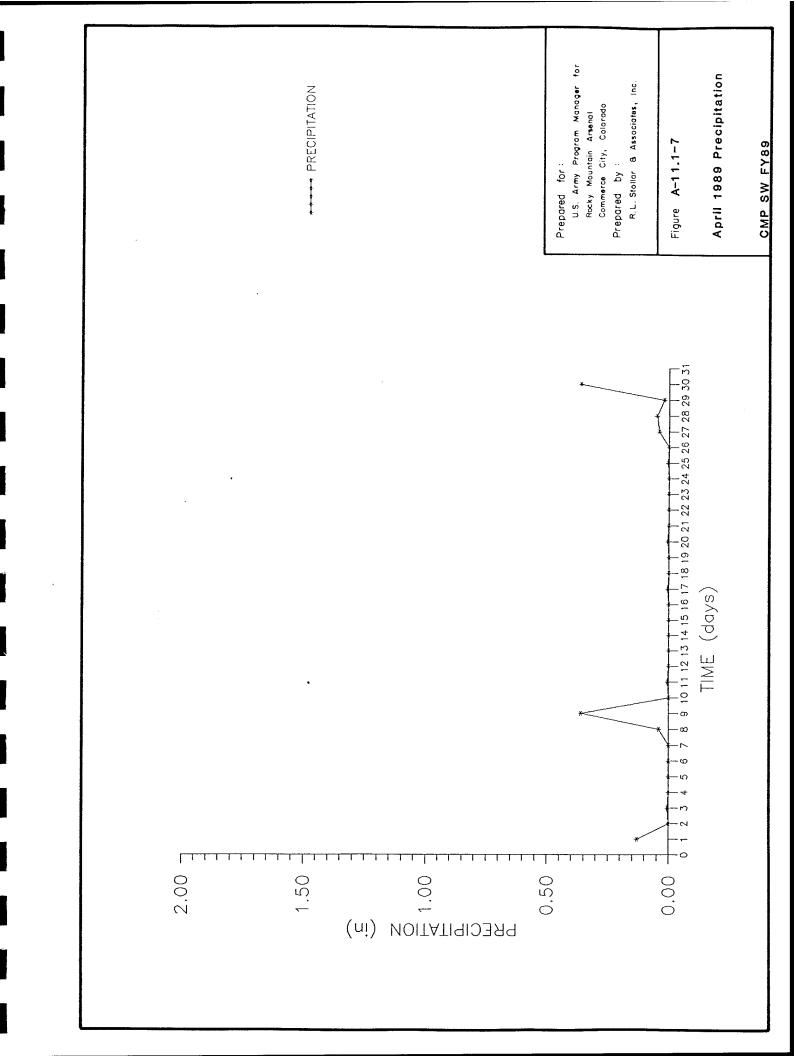


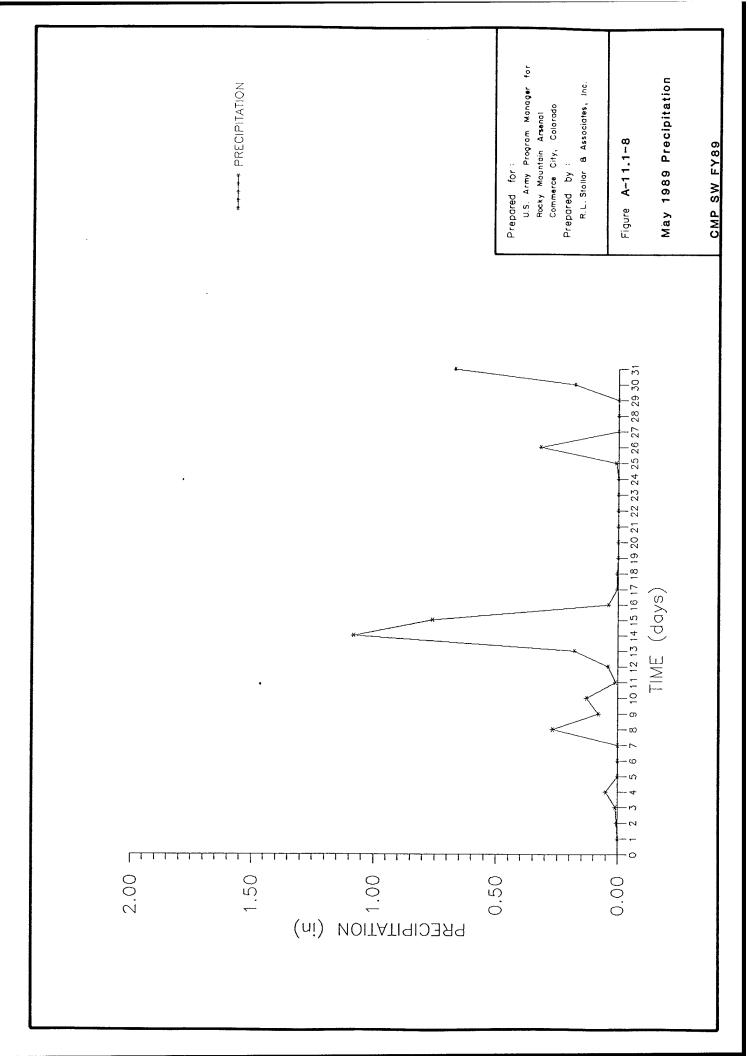


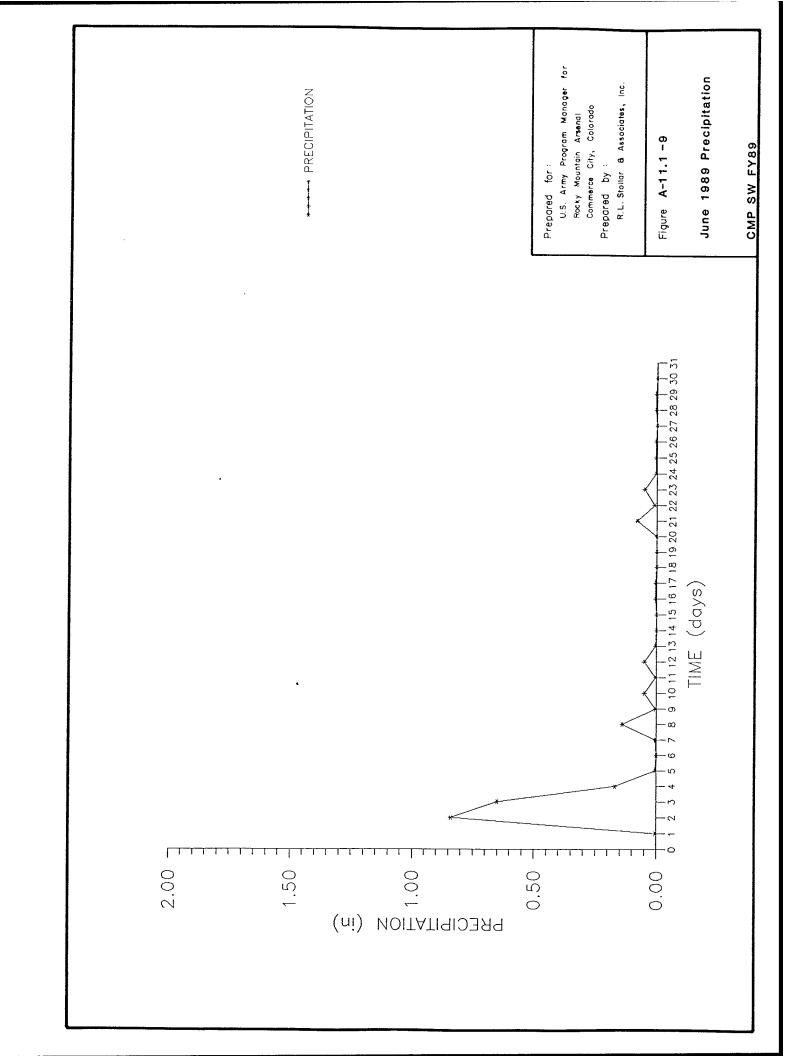


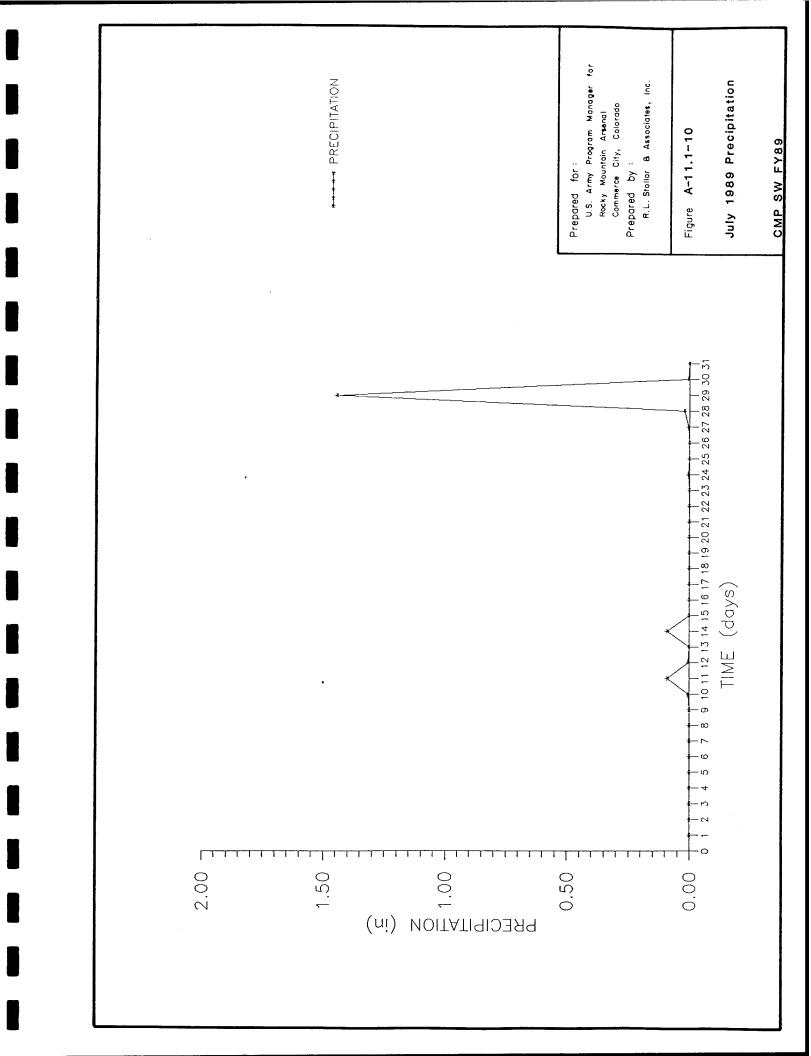


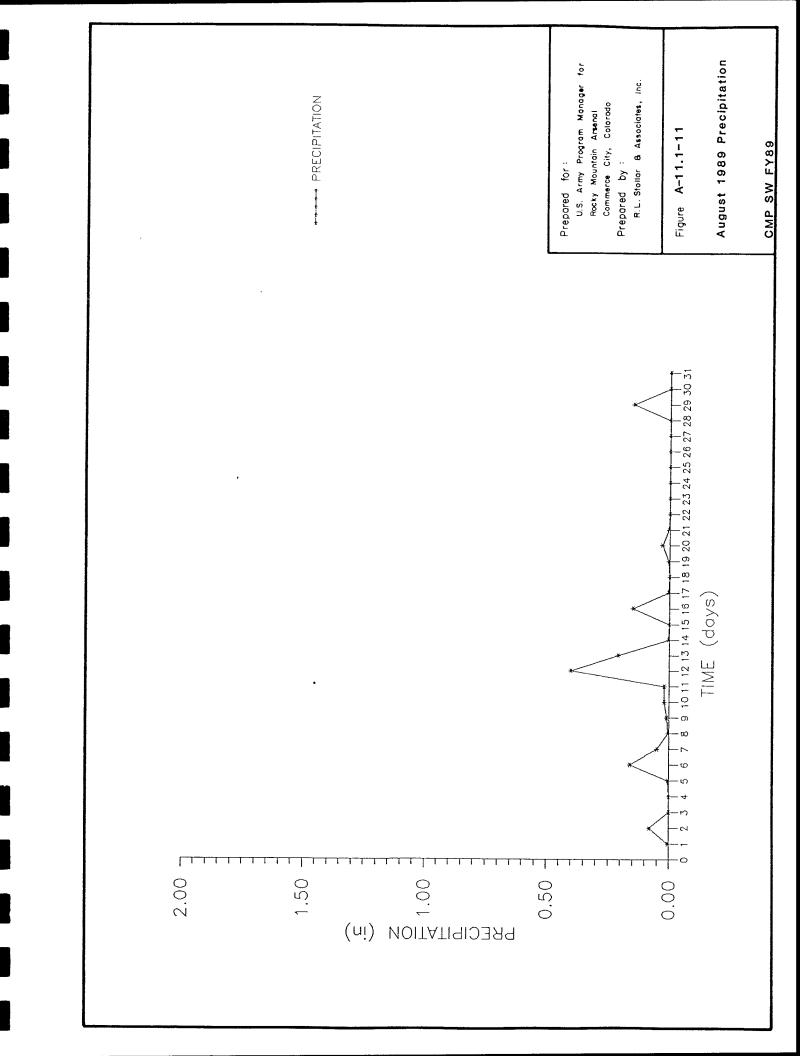


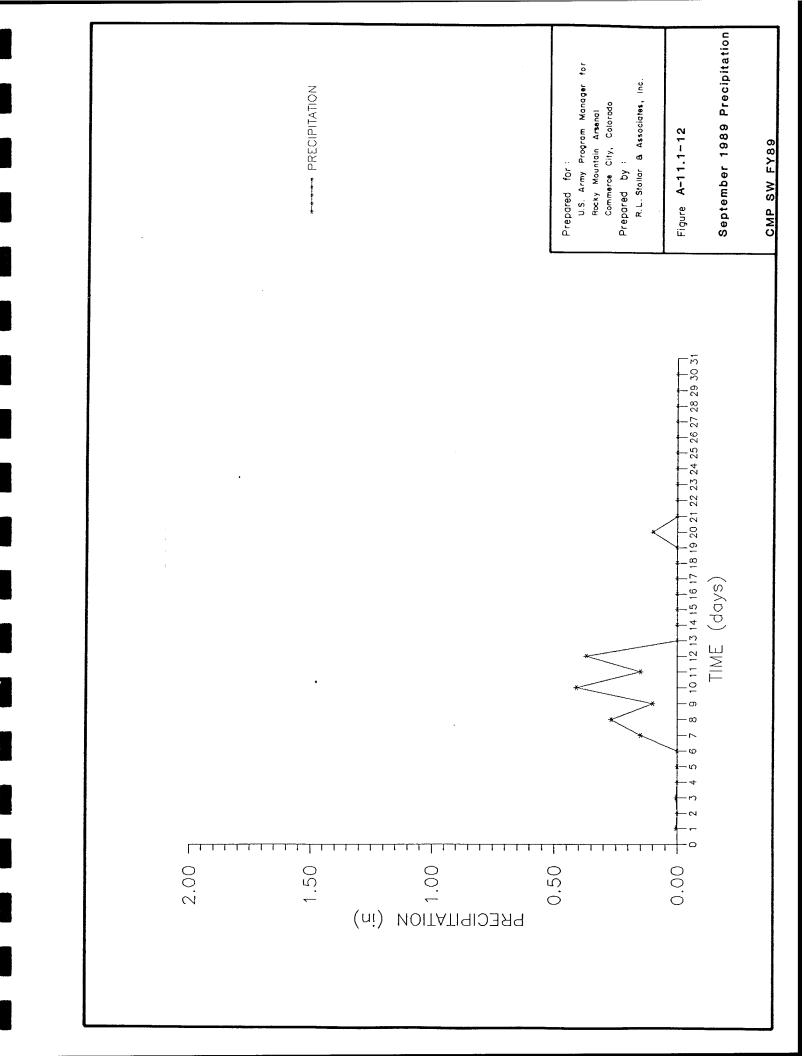












APPENDIX A-2

Instantaneous Discharge Measurements

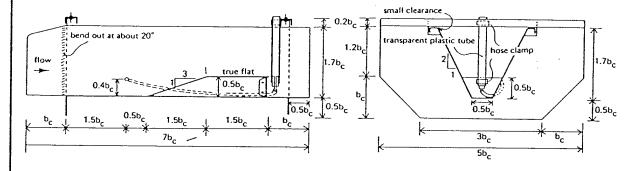
APPENDIX A-2.1

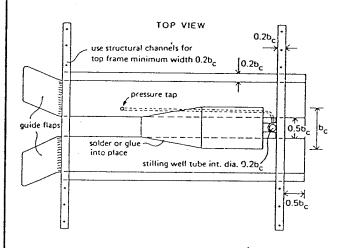
Flume Specifications

VIEWS

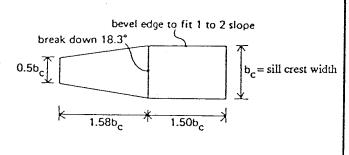


END VIEW





TOP VIEW SILL DETAIL



100 mm Flume	200 mm Flume
b _c = 100 mm	$b_c = 200 \text{ mm}$
= 3.94 in	= 7.87 in

Prepared for:

U.S. Army Program Manager for Rocky Mountain Arsenal Commerce City, Colorado

Prepared by:

R.L. Stollar & Associates, Inc. Riverside Technology, Inc.

Figure A-2.1-1

100mm and 200mm
Long-Throated Flume

Specifications

CMP SW FY89

Appendix A-2.1

Table 2.1-1 Stage Discharge Relationship for 100 mm Portable Long-throated

h	Q	
(ft)	Q (cfs)	
0.04	0.0078	
0.05	0.0113	
0.06	0.0153	
0.07	0.0198	
0.08	0.0247	
0.09	0.0301	
0.10	0.0360	
0.11	0.0424	
0.12	0.0492	
0.13	0.0565	
0.14	0.0643	
0.15	0.0726	
0.16	0.0814	
0.17	0.0907	
0.18	0.1004	
0.19	0.1107	
0.20.	0.1214	
0.21	0.1327	
0.22	0.1445	
0.23	0.1568	
0.24	0.1697	
0.25	0.1831	
0.26	0.1970	
0.27	0.2114	
0.28	0.2264	
0.39	0.2420	
0.30	0.2582	
0.31	0.2748	
0.32	0.2921	
0.33	0.3099	
•		

⁽¹⁾ Design and ratings taken from "Flow Measuring Flumes for Open Channel Systems"; Marinus G. Bos, John A. Repogle, Albert J. Clemmens, 1984 by John Wiley & Sons, Inc.

^{(2) &}quot;h" is upstream sill - referenced head.

Appendix A-2.1

Table 2.1-2 Depth Discharge Relationship for Long-throated Portable Flume with 0.66 ft (200 mm) wide sill (1)

h (ft)	Q (cfs)	h (ft)	Q (cfs)
	A Company of the Comp		
0.07	0.0367	0.37	0.6008
0.08	0.0456	0.38	0.6303
0.09	0.0552	0.39	0.6606
0.10	0.0655	0.40	0.6915
0.11	0.0765	0.41	0.7232
0.12	0.0883	0.42	0.7557
0.13	0.1007	0.43	0.7887
0.14	0.1137	0.44	0.8226
0.15	0.1275	0.45	0.8572
0.16	0.1419	0.46	0.8927
0.17	0.1570	0.47	0.9288
0.18	0.1727	0.48	0.9656
0.19	0.1891	0.49	0.9656
0.20	0.2062	0.50	1.042
0.21	0.2240	0.51	1.081
0.22	0.2424	0.52	1.121
0.23	0.2615	0.53	1.161
0.24	0.2813	0.54	1.203
0.25	0.3017	0.55	1.245
0.26	0.3229	0.56	1.288
0.27	0.3447	0.57	1.332
0.28	0.3672	0.58	1.376
0.29	0.3903	0.59	1.422
0.30	0.4142	0.60	1.468
0.31	0.4387	0.61	1.515
0.32	0.4640	0.62	1.563
0.33	0.4900	0.63	1.611
0.34	0.5167	0.64	1.661
0.35	0.5440	0.65	1.711
0.36	0.5721	0.66	1.762

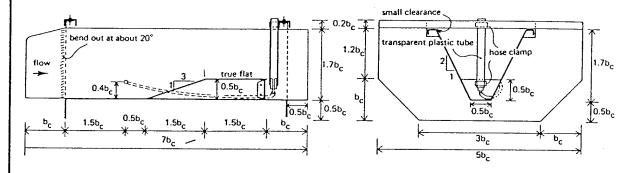
⁽¹⁾ Design and ratings taken from "Flow Measuring Flumes for Open Channel Systems"; Marinus G. Bos, John A. Repogle, Albert J. Clemmens, 1984 by John Wiley & Sons, Inc.

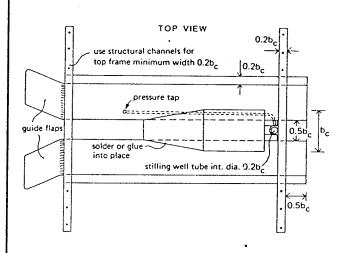
^{(2) &}quot;h" is upstream sill - referenced head.

VIEWS

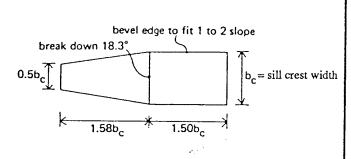
LONGITUDINAL SECTION

END VIEW





TOP VIEW SILL DETAIL



100 mm Flume	200 mm Flume
b _c = 100 mm	$b_c = 200 \text{ mm}$
= 3.94 in	= 7.87 in

Prepared for:

U.S. Army Program Manager for Rocky Mountain Arsenal

Commerce City, Colorado

Prepared by:

R. L. Stollar & Associates, Inc.

Riverside Technology, Inc.

Figure A-2.1-1

100mm and 200mm

Long-Throated Flume Specifications

CMP SW FY89

APPENDIX A-2.2

Discharge Measurement Procedures

A-2.2 Pygmy and Type-AA Current Meter Discharge Measurement Procedure

The following details procedure methods used in performing an instantaneous discharge measurement using pygmy or Type-AA current meters.

The calibration check for the Pygmy and Type-AA current meters are as follows:

- the rotor and shaft alignment was checked by spinning the bucket wheel;
- the cups were checked for damage and bending;
- the Type-AA tailpiece condition was checked; and
- a spin test was performed to check the condition of the bearing and record. A normal Type-AA meter spin test should never have been less than 1 1/2 minutes. The normal spin for a Pygmy meter should never have been less than 1/2 minute.

The Marsh-McBirney current meter is a factory calibrated electromagnetic-type meter and cannot be adjusted in the field. However, the battery, the electromagnetic sensor and internal electrical circuitry was checked. In addition the above field inspection procedures, each meters' manufacturer suggested instructions for routine care and maintenance was followed.

The following procedures were implemented to measure and calculate current meter instantaneous discharge rates:

- A measuring tape was stretched across the stream at right angles to the direction of flow to determine the width of the stream and to be used in the measurement of each flow cell.
- The spacing of the subsections (flow cells) was generally made by dividing the total width of the stream into 20 subsections. Sections were usually chosen so that no section contained more than 10 percent of the total flow. Equal widths (subsections) across a cross section were used unless the discharge was well distributed. For RMA where 20 sections were not usually possible a minimum distance of 0.3 feet between subsections was generally used.
- Recording stream stage from the staff gage and the recorder (if present). Identifying the starting point by either LEW or REW (left edge of water or right edge of water, respectively, when facing downstream). Recording the starting time on the

measurement sheet and on the recorder (if present). Recording the staff gage periodically during measurement and time in order to determine the mean gage height for the measurement.

- Recording the distance from the initial measuring point to the edge of water and the depth at the edge of water.
- For stream depths encountered during WY88, measurements were made at 0.6 depth using a top setting wading rod. This rod is masked so as to automatically suspend the current meter at 0.6 depth by "setting" the total depth on the wading rod.
- After the meter was set at the proper depth, it was allowed to stabilize to the stream current. The wading rod was kept in a vertical position and the current meter was held parallel to the direction of flow. The hydrologist stood in a position that least affected the velocity of the water passing the current meter by standing downstream and off to one side of the rod.
- The measuring and recording of flow velocity using the Pygmy or Type-AA meters was performed in accordance with the manufacturer's instructions. The minimum time for measuring velocity in each subsection was 40 seconds. A headphone set was wired into the meters and a click was heard in the headphones that corresponded to each meter revolution. The number of revolutions was recorded for each 40 second time interval. The velocity for each subsection was either calculated or obtained from the meter manufacturer's table for the numbered revolutions per 40 seconds. Marsh-McBirney meter measurements were obtained from the direct digital display on the instrument.
- The remaining stream flow measurement was obtained by moving to each of the verticals and repeating the process. Upon completion of the measurement the time and bank where the section ended and the stream staff gage and recorder water level was recorded on the discharge measurement sheet.
- The description of the stream bed, flow conditions, location of the measurement, weather and any other pertinent information which may have affected the accuracy of the measurement or the stage discharge relationship was recorded on the discharge measurement sheet.
- A field calculation that added the section widths, totalled the section widths and computed the discharge was performed.

Long-Throated Flume Discharge Measurement Procedure

Instantaneous discharge measurements are taken using either the 100mm or 200mm long-throated flumes depending on stream stage and flow conditions. The 100mm flume is capable of measuring flows ranging from 0.0078 cfs to 0.3099 cfs, and the 200mm flume is capable of measuring flows ranging from 0.0367 cfs to 1.762 cfs.

Both flumes are custom built, galvanized sheetmetal rated structures. A water intake port in the flume channel is hydraulically connected to a clear plastic stilling well that is attached to the structure. The water level in the flume channel is measured as hydraulic head in the stilling well. The structures are mathematically rated, which enables a conversion of the measured hydraulic head to a corresponding discharge.

Procedures for obtaining instantaneous discharge measurements with either the 100mm or 200mm long-throated flumes are as follows:

- Select a site in the channel for the flume. This site should be in a reach of the channel that is straight both upstream and downstream of the flume site. The channel should be free of obstructions and have uniform flow.
- Record gage height (if available) and time in the log book and on the data sheet.
- Prepare the channel at the flume site by removing any rocks or debris which will interfere with leveling and sealing of the flume during installation.
- Install the flume in the channel making sure the flume is stable and level. Leveling of the cross-slope and longitudinal slope may be done with a carpenter's level.
- Seal the bottoms and sides of both the upstream and downstream faces of the wingwalls of the flume with soil. The flume must be completely sealed so that all flow is diverted through the flume for an accurate measurement.
- Allow the flow to stabilize over the sill of the flume. Check for leaks around the edges and bottom of the flume and seal if necessary.
- Obtain the sill-referenced head by measuring the distance from the top of the sill to the water level in the stilling well with a metal tape measure.
- For each size of flume, a rating table was prepared (see stage discharge relationship

tables). Using the proper rating table, find the h value, in feet, and record the corresponding discharge value, in cfs. The head, discharge, time and gage height (if available) are recorded in the log book and on the data sheet. Generally, there are three discharge measurements taken at five minute intervals at each site.

APPENDIX A-2.3

1989 Water Year Instantaneous Discharge Measurement Records

WY89 Discharge Measurements Summary

APPENDIX A-2.3 TABLE A-2.3-1
SUMMARY OF DISCHARGE MEASURMENTS FOR MONITORING STATIONS

SITE ID#	SITE NAME	DATE	INSTRUMENT TYPE	DISCH (CFS)	STAGE (FT) START/STOP	COMMENTS LOCATION
sw01001	N. UVALDA	89269	FLUME-100MM	0.03	0.19	STAGE CONVERTED TO DISCHARGE
sw02006	STEAM PLANT	89117	FLUME-200MM	0.34	NA	EVEN WITH SURVEY STK
	EFFLUENT	89167	FLUME-100MM	0.09	NA	EVEN WITH SURVEY STK
		89201	FLUME-100MM	0.06	NA	EVEN WITH SURVEY STK
		89270	FLUME-100MM	0.11	NA	10FT UP STAKE
sw07001	UVALDA DITCH A	89268	FLUME-100MM	0.06	NA	
sw07002	UVALDA DITCH B	89268	FLUME-100MM	0.17	NA	
sw08001		89272	FLUME-100MM	0.14	NA	1100' ABOVE SW08003
รบกลกกร	S FIRST CREEK	, 80007 PYG	CURRENT METER	0.59	0.49	25FT BELOW GAGE
3#00003	5 TIKOT OKEEK		CURRENT METER	1.06	0.58/0.57	
		89115	FLUME-200MM	0.72	0.47	40FT BELOW GAGE
		89123	FLUME-200MM	0.86	0.50	40FT BELOW GAGE
		89125 PYG	CURRENT METER	9.23	1.23/1.22	40FT BELOW GAGE
		89134	NA	6.40	1.10	CALCULATED FROM STAGE
		89171	FLUME-200MM	0.69	0.48	30FT BELOW GAGE
		89201	FLUME-100MM	0.01	0.13	30FT BELOW GAGE
		89269	FLUME-100MM	0.10	0.22	30FT BELOW GAGE
		89272	FLUME-100MM	0.06	0.20	30FT BELOW WEIR
SW08004		89272	FLUME-100MM	0.04	NA	1400'BELOW SW08003
					. 70	70-2-2-01-15-15
SW11001	PEORIA INT	89116	FLUME-200MM	0.13	0.72	
		89134	NA ELLUE BOOM	14.01		CALCULATED FROM STAGE
		89201	FLUME-200MM	0.16	0.69	
		89270	FLUME-100MM	0.05	0.70	TOURT BELOW GAGE
sw11002	HAVANA INT	89101 PYG	CURRENT METER	1.46	0.52/0.51	8FT DWNSTR BUBBLER
		89116 PYG	CURRENT METER	0.37	0.25	UNDER OLD BRIDGE
		89130	NA	20.87	1.00	CALCULATED FROM STAGE
		89201	FLUME-200MM	0.37	0.23	END OF CONC CHANNEL
		89270	FLUME-200MM	0.49	0.25	END OF CONC CHANNEL

APPENDIX A-2.3 TABLE A-2.3-1
SUMMARY OF DISCHARGE MEASURMENTS FOR MONITORING STATIONS

SITE ID#	SITE NAME	DATE	INSTRUMENT TYPE	DISCH (CFS)		COMMENTS LOCATION
sw12001	UVALDA DITCH C		PYG CURRENT METER FLUME-200MM	0.33 0.27	NA NA	
01/12005	C. IIIVALDA	80080	PYG CURRENT METER	0.26	3.85	30FT BELOW WEIR
2M 12002	S. UVALDA		PYG CURRENT METER	0.30	3.85	
			PYG CURRENT METER	0.35	3.80	
		89111	FLUME-200MM	0.26		30FT BELOW GAGE
		89130	NA NA	4.53		CALCULATED FROM STAGE
		89171	FLUME-200MM	0.54	3.88	40FT BELOW GAGE
		89269	FLUME-200MM	0.30	0.51	30FT BELOW GAGE
		89272	FLUME-200MM	0.17	0.50	50FT BELOW GAGE
sw12008		89272	FLUME-200MM	0.11	NA	.41MILES BELOW 12005
sw12009		89272	FLUME-200MM	0.10	NA	.90MILES BELOW 12005
sw24001	SEWAGE PLANT	89138 89270	NA/VOLUMETRIC NA/VOLUMETRIC	0.01 NA	NA NA	END OF PIPE VARIABLE FLOW
sw24002	N FIRST CREEK	89111 89123	PYG CURRENT METER PYG CURRENT METER FLUME-200MM PYG CURRENT METER	0.32 0.31 0.79 3.35	0.46/0.47 0.52	55FT BELOW GAGE
sw24004	FIRST CREEK NORTH BOUNDARY	89114	FLUME-200MM	0.14	NA	
sw30002	FIRST CREEK AT NORTH PLANTS	89114	FLUME-200MM	0.46	NA	
sw36001	BASIN A	89271	NA-VOLUMETRIC	0.02	0.11	END OF DISC PIPE

APPENDIX A-2.3 TABLE A-2.3-1 SUMMARY OF DISCHARGE MEASURMENTS FOR MONITORING STATIONS

SITE ID#	SITE NAME	DATE	INSTRUMENT TYPE	DISCH (CFS)	STAGE (FT) START/STOP	COMMENTS LOCATION
sw37001	FIRST CREEK OFF-POST	0,011	CURRENT METER CURRENT METER FLUME-200MM FLUME-100MM	0.29 0.31 0.54 0.02	0.51 0.52 0.58 0.58	40FT ABOVE FLUME 30FT ABOVE GAGE 40FT ABOVE FLUME 10FT BELOW FLUME

NA - NOT APPLICABLE PYG - GURLEY 625 PYGMY CURRENT METER WY89 Discharge Measurement Field Records

	MEASUREMENT NO. COMPILED BY CHECKED BY
	STATION NAME NARTH UXALDA SUCELOST
69258	DATE 9126 1987 PARTY SEGY, IGNOTH AREA NA VEL NA GH 11
	METHOD ICEDIANO ELLINGANO. SECS G.H. CHANGE
	WETER TYPE SPIN BEFORE MEASAFFER
	MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (O FOLLOWING CONDITIONS: CROSS SECTION
	FLOW LOLD, UNIFOCMS WEATHER PARTY CLOW?
	OTHER AIR ~75 o
	GAGE SION, Hype C WATER 15.8 9
	RECORD REMOVED OC INTAKE I

IN HRS.

DISCH

MEAS, PLOIS WAY & DIFF FROM AAA RATING WADING, (UPSTB); DOWNSTR., SIDE BRIDGE 15 FEET, MILE, (ABOVE) BELOWGAGE, AND	W DIFF, FROM AN ANSTR., SIDE BRIDGE	A RATING	AILE, (ÁBOVE) B	ELOWGAGE, AND	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	EXCELLENT (2%), GOC IS: CROSS SECTION_	OD (5%), FAIR (8%), POOR (OVER	8%), BASED ON	
FLOW JOLD, WOLFORM		WEATHER PARTLY CLOWDY W75"F	הביישה	175%	
ОТНЕВ		AIR	~75 F@	1120	
GAGE SION, Hype C	7	WATER	ATER 15.8 900 1151	151	
	_ RECORD REMOVED_	00	60 "F - INTAKE FLUS	(6 C ×F USHED L \C	
OBSERVER					
CONTROL CRONENY	x rotch	2120			
REMARKS				T	
G.H. OF ZERO FLOW				F	
	GAGE READINGS	ADINGS			
TIME		RECORDER	INSIDE	OUTSIDE	
1137				61	
WEIGHTED M.G.H.					
G.H. CORRECTION					
		_			

Discharge			Fue															
Area			TYNETH F															
Velocity	1 2341 E 3 M C		Not Co	ACALCA!														
Time in Seconds	20%t		SENCY INC	BOA F														
Revolutions	14	r 1 100 15	SOET N	3(2) (2).														
Depth	1 - fuel - Levis - 1	17		E entric														
Width	3	767	NO. PA	Covered														
Distance from Initial Point		15.5	1335															
Distance Initial P		- 1	1		0													

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CORRECT M.G.H.

START FINISA

DISCHARGE MEASUREMENT NOTES R. L. STOLLAR & ASSOCIATES

_RATING _ FEET, MILE, ABOVE, BELOW GAGE, AND PLANTS STEAM EFFLUENT (SWODOOD) WEATHER GOOL, CLOWAY, LTWIND MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION INTAKE FLUSHED L NA 1500 O05/_@30-727 ,19 89 рапту ТД, LB, KH REA VEL G.H. DISCH. AIR 55 F@ G.H. CHANGE NA WATER 05 4 RECORD REMOVED METER TYPE NAME AFTER NAME SPIN BEFORE MEAS. NAME AFTER NAME MEAS. PLOTS % DIFF. FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE LONG THEOMED FLUME NO. SECS AREA GAGE NUNE INSTALLED FLOW LOW - UNIFORM STATION NAME SOUTH 21118 MEASUREMENT NO. COMPILED BY CHECKED BY METHOD DATE WIDTH OTHER

HRS.

CONTRUC INSTALLED 50 G.H. OF ZERO FLOW REMARKS CONTROL

OBSERVER

		 	 	-	 -		1
	OUTSIDE						
	INSIDE						
ADINGS	RECORDER						
GAGE READINGS							
	TIME				W ЕІGHTЕD М.G.H.	G.H. CORRECTION	CORRECT M.G.H.

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Discharge																
Агва	46															
Velocity	FLUME															
Time in Seconds	HROATEL	0		Q.	7.21											
Revolutions		06.		. 630	7 /		47									
Depth	9NOT 0	1486		1987	OTAL N		.34									
Width	USED	10 gr	4	6	707	(- B									
Distance from fnitial Point		10/		101												

MEASUREMENT NO. COMPILED BY CHECKED BY	Distance from Initial Point
STATION NAME SOUTH PANTS SIEAM EFF SW 02006	
DATE 89/67 4/6 19 89 PARTY JE SUBSTITE OF	198
NO. SECS VA G.H. CHAI	///
74 DATES	7//
WADING, UPSTR., DOWNSTR., SIDE BRIDGE FEET, MILE, ABOVE, BELOW GAGE, AND	11
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	
FLOW LOW- UNIFORM WEATHER WARM, SUMMY, DO WIND	
OTHER	
GAGE NOWE INSTALLED WATER 205 OF 1125	
RECORD REMOVED NA INTAKE FLUSHED L NA	
OBSERVER	
CONTROL Nº LONTROL INSTALLED	

	-									
	F		OUTSIDE							
			INSIDE							
		ADINGS	RECORDER							
		GAGE READINGS								
100	LOW			•				з.н.	NO!	H.
200	a.n. OF ZENO FLOW		TIME					WEIGHTED M.G.H.	G.H. CORRECTION	совяест м.с.н.

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	并	27,007	10/28																
Discharge		1	0),																
Area	\$12010		7					7		2									
Velocity	49 BY							FINA		7									
Time in Seconds	TH 20 47	2,476	11/1C E					1		060							-		
Revolutions	6006	2 /4%		110	0.17	0.17		h = 6		7						ţ			
Depth	0 mm		21210	= 4	7 4	14		037	(- 6									
Width	01	i	1 1	000	5	30 -		CAL											
Distance from Initial Point	0.540	1		116	11.35														

REMARKS

MEASUREMENT NO. COMPILED BY CHECKED BY	Distance from Initial Point	Widt
STATION NAME > F STEAM EFF		
DATE \$920/ 7/20 19 89 РАНТУ 72- 07/ WA DISCH.0,0565		
	1291	
SPIN BEFORE MEAS. A.A. AFTER A.A. MAMAS. PLOTS NA. W.A. W.DIFF. FROM RATING	1830	
WADING, UPSTR., DOWNSTR., SIDE BRIDGE FEET, MILE, ABOVE, BELOW GAGE, AND	7	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	1535	
FLOW LOW - UNIFORM WEATHER WARM SUNNY	100	
ОТНЕЯ 90 40 /530	2/17	
GAGE NUNE AUSTALLED WATER 70 of 1530	1545	
RECORD REMOVED N. W. INTAKE FLUSHED L VI		
OBSERVER		
CONTROL MONE INSTALLED		
REMARKS @ TAKEN AT SAMPLE POINT		

G.H. OF ZERO FLOW			ij		}	
GAGE R	GAGE READINGS					
TIME	RECORDER INSIDE	INSIDE	OUTSIDE			
WEIGHTED M.G.H.						
G.H. CORRECTION						
CORRECT M.G.H.						

Discharge				
Area	100	0.0	8	
Velocity	C4777		2	
Time in Seconds	10 m 10 m		056	
Revolutions	1901 LEARCH	6.0		
Depth	74	7 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	788	
Width				
Distance from Initial Point	1527	1540		

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MEASUREMENT NO. COMPILED BY CHECKED BY	770				
STATION NAME SON OZ CO	02000			The state of the s	
DATE 67276 WIDTH	9/27 .19 89 AREA	P/ /EL.	2,5 <u>66</u> 6.H. 1/2	679 DISCH: 1/07	
METHOD ANGLOS	NO. SECS	G.H. CHANGE	NGE	INHRS.	
METER TYPE SPIN BEFORE MEAS. MEAS. PLOIS. WADING, UPSTR., PLOM	AFTER % DIFF. FROM NSTR., SIDE BRIDGE	RATING ZC2 FEET, I	S MILE, ABOVE, E	STANCE, STANT C. STANT C STANT C STANT C	0 -
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	EXCELLENT (2%), GOO IS: CROSS SECTION_	¹ D (5%), FAIR (8%), POOR (OVER	18%), BASED ON	•
FLOW_colal	WEA	WEATHER Z	1 0 la		
ОТНЕЯ		AIR	\$ 0.50	٠, ١٠٠٠	
GAGE KONE	1.11 stalled	WAT			· · · · · · · · · · · · · · · · · · ·
OBSERVER	RECORD REMOVED		_ INTAKE FLUSHED	1	· · ·
					·
CONTROL COLOR	1/15tolle	8	-		
REMARKS	John Sans				
G.H. OF ZERO FLOW				FT	- 1
	GAGE READINGS	ADINGS			
TIME		RECORDER	INSIDE	OUTSIDE	
					<u>. </u>

large																4.10						!			l				
Disc	L												71	48	- 1	- 1													
Area		3		1	1 ~		1325		,	4			2 Se	C(
Velocity													x C	Psil								2							
Time in Seconds		1	ļ	0 FS	11107		11/67						d	0 0 2	- 1			,32,		,6%		40							
Revolutions		hoor										(CT C	12	- 1	1		1		5,5		1/10							
Depth		,	Ĵ	47.4	61.		6/1		Ů,	, , ,			35 26	Tu Se	, ,	120		2,2		,	- 1	.							
Width		2											2	00	1)	. 7		,5,		861		7 2							
Distance from Initial Point		100	-		#1				1	1			1070	top	12/4	20/2													
	Width Depth Revolutions Seconds Velocity Area	Width Depth Revolutions Seconds Velocity	Width Depth Revolutions Seconds Velocity Area Seconds Seconds Time in Area Seconds Seconds Area Seconds Seconds Area Seconds Seconds Area	Width Depth Revolutions Seconds Velocity Area Seconds Seconds Seconds Area	Width Depth Revolutions Seconds Velocity Area 0.77 2.65 2.77 2.77 2.77 2.75 <th>Width Depth Revolutions Seconds Velocity Area 2</th> <th>Width Depth Revolutions Seconds Velocity Area 7</th> <th>Width Depth Revolutions Seconds Velocity Area 7</th> <th>Width Depth Revolutions Seconds Velocity Area 7</th> <th>Width Depth Revolutions Seconds Velocity Area 7</th> <th>Width Depth Revolutions Seconds Velocity Area 7</th> <th>Width Depth Revolutions Seconds Velocity Area 7.7</th> <th>Width Dopth Revolutions Time in Velocity Area D. 2000 1.00 1.00 1.00 1.00 1.00 1.00 1.0</th> <th>Width Depth Revolutions Time in Velocity Area D 7.7. C</th> <th>Width Depth Revolutions Time in Seconds Velocity Area DD 7.7</th> <th>With Depth Revolutions Time in Velocity Area 7.7 7.7 7.7 7.7 7.7 7.7 7.7 7</th> <th>With Depth Revolutions Time in Velocity Area Do 1.02</th> <th>Width Depth Revolutions Time in Seconds Velocity Aea Do Co. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.</th> <th>Width Depth Revolutors Seconds Velocity Aea D. 1.7.</th> <th>With Depth Revolutors Seconds Velicity Aea D 1.7.</th> <th>Well Depth Revolutions Seconds Velocity Area Depth</th> <th>Well Depth Revolutions Seconds Velocity Area Depth</th> <th>Worth Despin Revolutions Time in Seconds Velocity Area of Control Cont</th> <th>Worth Despit Revolutions Time in Seconds Velocity Area D. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1</th> <th>With Donn Revolutions Seconds Velocity Area Do 1.25</th> <th>Width Depth Revolutors Succeeds Velicity And Depth And Succeeds Velicity And Depth And Succeeds Velicity And Depth And And And And And And And And And And</th>	Width Depth Revolutions Seconds Velocity Area 2	Width Depth Revolutions Seconds Velocity Area 7	Width Depth Revolutions Seconds Velocity Area 7	Width Depth Revolutions Seconds Velocity Area 7	Width Depth Revolutions Seconds Velocity Area 7	Width Depth Revolutions Seconds Velocity Area 7	Width Depth Revolutions Seconds Velocity Area 7.7	Width Dopth Revolutions Time in Velocity Area D. 2000 1.00 1.00 1.00 1.00 1.00 1.00 1.0	Width Depth Revolutions Time in Velocity Area D 7.7. C	Width Depth Revolutions Time in Seconds Velocity Area DD 7.7	With Depth Revolutions Time in Velocity Area 7.7 7.7 7.7 7.7 7.7 7.7 7.7 7	With Depth Revolutions Time in Velocity Area Do 1.02	Width Depth Revolutions Time in Seconds Velocity Aea Do Co. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Width Depth Revolutors Seconds Velocity Aea D. 1.7.	With Depth Revolutors Seconds Velicity Aea D 1.7.	Well Depth Revolutions Seconds Velocity Area Depth	Well Depth Revolutions Seconds Velocity Area Depth	Worth Despin Revolutions Time in Seconds Velocity Area of Control Cont	Worth Despit Revolutions Time in Seconds Velocity Area D. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	With Donn Revolutions Seconds Velocity Area Do 1.25	Width Depth Revolutors Succeeds Velicity And Depth And Succeeds Velicity And Depth And Succeeds Velicity And Depth And			

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WEIGHTED M.G.H. G.H. CORRECTION

CORRECT M.G.H.

MEASU HEMEN I NO. 72. COMPILED BY CHECKED BY			
STATION NAME SCORE COL	The state of the s		
DATE 65268 2/25 19 8 WIDTH	19 85 PARTY S.G. 6322	6.4. Gr32 J-G 6.4. DISCH , C 6	0
METHOD /-/2///_ NO. SECS	G.H. CHANGE		HRS.
METER TYPE SPIN BEFORE MEAS. AFTER MEAS. PLOTS % DIFF. FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE	RATING FEET, I	– NG FEET, MILE, ABOVE, BELOW GAGE, AND	.: AND
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION)D (5%), FAIR (8%), POOR (OVER 8%), BASE	NO O
FLOW / Cold Chr. Form WEATHER C	ATHER CICCO	~ warm	
ОТНЕЯ	AIR	75 F@ /C/C	
GAGE LONE.	WATER /	WATER 12,9 oF@ 052	~ <u> </u>
RECORD REMOVED			.
OBSERVER			1
CONTROL L'ES 115 XEL	12/		-
REMARKS 155/ 30 m place -	Flum	10 xalle	:
GH. OF ZERO FLOW	leis cle	Kened polec	V E
GAGE RE	GAGE READINGS		
TIME	RECORDER	INSIDE OUTSIDE	T.,,
			\neg
		_	_

Discharge						, , , , ,										
Area		1.00	5/750	0250	0550	-45C	3/1	11/6								
Velосиу						200		445e			2					
Time in Seconds		CAS	10643	5673	.0643	200	4	9	, , ,	4) /2	3 CA					
Revolutions	3					7	, X	FAS	C-	71	- 066					
Depth	17/1	474	17/1	17/	1,77	1,5 4%	156	0410	1 \ 1	5	177/1					
Width	600					16	C. A. S.	10/4	1	20 %	20		The second secon			
Distance from	100		1#	# 2	* X	10k	76,0	10 Xa								

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WEIGHTED M.G.H. G.H. CORRECTION

CORRECT M.G.H.

MEASUREMENT NO. T.G. COMPILED BY CHECKED BY				Distance from Initial Point	Width	Depth	Revolu
STATION NAME SELO 7002				100	1 104	1/20	
DATE 2/25/83 82268 119 87 PARTY GROJES S. S. WIDTH	PARTY _G	8070	20	1		4	
Ġ	G.H. CHANGE	G.H. ACOUNT	DISCH TO IN	1 20		5.23	
MEAS. AFTER	! !			#2		152.	
MEAS. PLOTS % DIFF FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE	RATING FEET, I	AILE, ABOVE, B	ING FEET, MILE, ABOVE, BELOW GAGE, AND	#3		15.61	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	%), FAIR (8%), POOR (OVER	8%), BASED ON				
FLOW CON WEATHER C		Parc					
ОТНЕЯ	AIR	ZŠ #@	1/20	200	1	77.	2
GAGE	WATER	@ J o					
RECORD REMOVED		INTAKE FLUSHED	U SHED L	Tiego	24, 70	Se X	4
OBSERVER			Try Mary 1 had a suffer program				
	!			10th	12	7 7 7	41
CONTROL Mone Installed					2		
REMARKS L'O Station	13/	Sarra	2/m		5	92,	
BH OF ZEBO ELOW)		\$15.	7	
SOUND TO SOU	3		T4			_	1
GAGE REAL	Siss					7.4.7	7
IME	RECORDER	INSIDE	OUTSIDE				
WEIGHTED M.G.H.					+		

Discharge	1						5										
Area	17	1	3	5011	1110		11 10	4				5					
Velocity			AB GO		Mada M		() * ()		50			7 9001	45				
Time in Seconds	C.P.S	3751	j	1697	5/26/		Secon	270	11	29'	2.4	697 198	7-5/				
Revolutions	3						of yo	St.	To K	(1)	10	3	=				
Depth	Elda	52.	1	7.5%	15.61		neh	x X	244	25 , 26	2,1		.25				
Width	1 000						1/6	J 75	200	5	8/2		125.				
Distance from Initial Point	100	1#	n A		#3		10 16	700	Total								
		ds	ZZ.		9	 		· · · · · · · · · · · · · · · · · · ·	 					 	 	 	

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G.H. CORRECTION

MEASUREMENT NO. 76 COMPILED BY CHECKED BY	Dist
STATION NAME SCUOSCO/ S. 1St Creck	1
DATE 89272 9/27, 19 89 PARTY 6 P.P. TG WIDTH AREA VEL. G.H. 2006 DISCH. 1/4	<u> </u>
. 41	
METER TYPE SPIN BEFORE MEAS. AFTER RATING MEAS. PLOTS % DIFF. FROM RATING WADING, UPSTR., DOWNSTR., SIDE BRIDGE FEET, MILE (ABOYE; BELOW GAGE, AND	1 / 14
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	<u> </u>
FLOW Good Charter WEATHER Chercy LENGARD	
ОТНЕЯ AIR 8.5 F@ 1/55	<u>'</u>
GAGE WATER 15. 2 9 0 11,55	7
RECORD REMOVED INTAKE FLUSHED L	1,7
OBSERVER	1/
CONTROL LEST C	
REMARKS (2001) / Less monders concart - Fiell Sungling	<u> </u>
Suspended seel. Sangle tallen	
G.H. OF ZERO FLOW	
GAGE READINGS	1

Discharge								10/	125					3				
Area			11/20	5/11	0.8//	5577	(1)		1(
Velocity							2 X 2	4 I. I	74,50		(4)		1 1					
Time in Seconds		1 1	245	5561.	1445	551			50 13	261	,22,							
Revolutions	426						4		7 70	11	11 V	\						
Depth			1	22,	.22	,22	47	X	12th	1.20	7	0	1 1					
Width	Show Show						i	s x	1 de	5'	,	7						
Distance from Initial Point	00)			1#	#2	*	70/	700	10th								-	
		JSCH. 1/4/	IN HRS.		OW GAGE, AND	6), BASED ON	1/55	// 5 S U ED L			S. James	<u> </u>	OUTSIDE					

INSIDE

RECORDER

TIME

WEIGHTED M.G.H. G.H. CORRECTION

CORRECT M.G.H.

74RT (30)

LAG

7 4.4

WY84 # 84 PB 68102 MEASUREMENT NO. COMPILED BY CHECKED BY

NEW SOUTH FIRST UPLETT SUUBOUS STATION NAME

7 AREA 2972 VEL. 300 GH .79 DISCH. 594 IN CO. HRS. Ø G.H. CHANGE METHOD METER NO. SECS 80 4-4 WIDTH

Pyeny Cuepent meter METER TYPE GUNCLON NO 625 PYGOTY CULPANT MLETYN SPIN BEFORE MEAS. 52 AFTER DND MEAS. PLOTS "DIFF, FROM RATING WADING, UPSTR., ROWNSTR., SIDE BRIDGE 25 CEEL MILE, ABOVE, BELOW GAGE, AND

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

168713

B ¥@ 1130 PARTLY CLOUDY LOW- MODINGATINE WEATHER PARTLY DEPARTMENTS OF STACKING AIR 70 OTHER FLOW_

INTAKE FLUSHED L NO 130 _ _ _ _ 200 WATER Ş RECORD REMOVED_ STAFF - GOOD COND GAGE __

- 15' UPSTREAM V- NOTCH CONTROL

OBSERVER

ON 13 AZA SIDE TO IND POWER FLUW. CHANNEL STABLE FLUW. CHANNEL STABLE FLUW. CONSTAINS THE BLE WEDS UPSTAINSTAIN OF X-SECTION 7 ンとなどし BUILT INTOWNADS BANTS REMARKS

0.49 0.49 OUTSIDE 0.49 BOISNI RECORDER 0.49 0.49 0.49 GAGE READINGS G.H. CORRECTION WEIGHTED M.G.H. カナニ 1130 120 TIME

Discharge	0000	0000	0057	640,0	1,40.0	2400	0.046	0,0461	0.000	0.000	0.050	2,000	0.007	0.055	8.029	0.000	o.oyu	0.03/	0.000	0.000		465,	1						
Area	200	hhi'0	L	0.164	1 .	891'0	-	_	├	0,192	0, 188 0	0.192	0.308		12/	0.767	0.148	132	 	0.000	 		\ '	2,473					
Vel∞ity	0.000	0.00	0,333	0.300	9980	0.366	0.300	6.333	0,033	0.033	0,366	0.133	0.033	0.300	0.167	0.367	0,300	0,333	0.000	0,000		\	2000						
Time in Seconds	30	30	30		30	30	30	30		30	30	36	30	30	0	30	30	30	30	0 %									
Revolutions	0	0	10	6	8	Þ	6	11-	1	/	90	†	/	4	6	17	6	7	O	0									
Depth	.15	36	,43	.4/	.39	. 42	.38	77.	.43	81.	44.	, 48	,52	. 46	44	14,	.37	. 33	8/8/00	3602									
Width	.2	t .	<i>t</i> .	7.	4,	4.	<i>h</i> .	4.	μ,	4.	4	7	7	Enoth 4	, 4	h -	<i>t</i>			27									
Distance from Initial Point	4.4	х 1,	3, 2	3,6	4,0	4.4	4,8	215	5.6	6,0	126.4	8	7,2	7. B. Carollo	0,0	4.8	2.3	9,2	9.6	4.8									

FOPM31 / DEC 87

o.fa

0.49

R. L. STOLLAR & ASSOCIATES

10 10

WID TH 17.8 UPSTREAM

G.H. CHANUE WERENT NO! NN63489 METER TYPE GURLEY # 625 PYCMY CURRENT NO.; NN63489 NEAS. SO AFTER PATING MEAS. PLOTS WDIFF, FROM WADING, UPSTR, DOWNSTR, SIDE BRIDGE 43 (EET) MILE, ABOVERBELOW GAGE, AND DISCH. 1.064 45mph MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION IN 1.5 HRS. INTAKE FLUSHED L NO of@ 1536 4@ 1536 TO MODERATE WEATHER SUNNY LIGHT WIND AREA 3.012 VEL. . 395 G.H. .57 G.H. CHANGE AIR 50 WATER 45 CREEK DISCHARGE MEASUREMENT NOTES RECORD REMOVED 40 FIRST 20 FLOW METERNO. SECS GA66 500FH APPIL 18 STAFF MEASUREMENT NO. COMPILED BY CHECKED BY STATION NAME FLOW LOW OBSERVER METHOD OTHER . WIDTH GAGE DATE

CONCRETE WEIR ~ 30 FT UPSTREAM	REMARKS REMOVED TUMBLEWEEDS AND AQUATIC GROWTH	10'-20' below cement control structure	T3V
CONCRETE	EMOVED TUR	belon e	FLOW
CONTROL	REMARKS &	10'-20'	G.H. OF ZERO FLOW_

GAGE F	GAGE READINGS		
TIME	RECORDER	BOISNI	OUTSIDE
1536		18 8J	20.58
1536	.51	top	Tropies To
1627	.67		157 4/4
1.6.4.7	,57		,57
WEIGHTED M.G.H.			
G.H. CORRECTION			
CORRECT M.G.H.	53		

Discharge	0.000	0.037	1400	0 039	1 .	0,0%	0033	0.034	0.034	0.037	0.045	6.047	0.03	0,000	0.039	20.0	0.049	0.057	0.061	1500	0,050	0,062	0,059	0.046	4600	G. ⊙@	0000		\	1.064			
Area	090,	,123	1126	14/	1944	147	132	139	135	135	051,	£ <i>51</i>	95),	6515	951.	471.	177	h2/'	177	159	147	./38	761	.123	960,	000	000		\	2112	-l		
Velocity	0,000	0,300	0.325	,	0.325	0.275	0.250	0,250	0.250	0.275	0.300	0.275	0,250	0,250	0.250	0.250	0.275	0.325	0,350	0.350	0.350	0.450	0.450	0.375	0.350	0000'0	0.000		796	<i>b</i> .			
Time in Seconds	05	940	40	94	Ŗ	94	40	40	40	Oh	40	46	0h	40	40	40	40	05	40		0/2	<i>Qħ</i>	40	04	04	0/-	9.0		٠				
Revolutions	\varnothing	71	6)	11	۲)		01	01	01		7	-	Q/	0/	0/	0/	//	13	61	\	7	81	18	75	61	Ø	0	-			•		•
Depth	ah'	1,41	3 h	Lh'	148	.49	<i>}\\</i>	66'	56	,45	. 50	らし	125	,55	,52	. 58	65	85′	86'	275	6/1.8	9,	44	14/	.32	,32	00'		,	se s			
Width	51'	,30	,30	98′	Ý	ى3ر	08'	,30	,30	,30	.30	, 30	,30	.30	30	.50	.30	30	. 30	08'	.30	30	30	.30	130	0.00	. 15			,	٧		
Distance from Initial Point		3,20			5.5	4.40	4.70	500	53	5,60	5.90	6,20	6.50	08.9	7,10	7.46	7.70	8,00	8.30	8.60	8,90	9.30	2,50	7.80	10.10	04'01	10.70						

1035 - Measurement tehen

& ASSOCIATES "P'	EASUREMENT NOTES
R. L. STOLLAR	DISCHARGE MI

MEASUREMENT NO. COMPILED BY CHECKED BY	Distance from	A HOSA	to do	a
STATION NAME SOUTH FIRST CHEECE (SWOSOO3)			Index .	1
WIDTH NA AREA 19 84 PARTY JL RG DISCU 37 21				
			 	11
MEAS. NA AFTER WA		5)=/0	,
MEAS. PLOTS WADING, UPSTR. (BELOW GAGE) AND FEET) MILE, ABOVE, (BELOW GAGE) AND		-		1
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION		h =	.4	11
FLOW WAITER SUNNY, BREEZY				
OTHER 70 54@ 1015				
GAGE CLEAR WATER 64 OF 1015				
RECORD REMOVED COA INTAKE FLUSHED L NO				
OBSERVER CONSERVER				
CONTROL CLEAR				
REMARKS Aumpled Spring of Jan 8				
and the				
AH OE ZEBO EI OW				
GAGE READINGS				

								1															
Discharge						6	Se if Lo																
Area							can																
Velocity						,	16. 4	5															
Time In Seconds		1		= 4			0 %																
Revolutions		7	8 /	149	`	k	311																
Depth			× /) = /Q			.4																
Width			,	(10)	,	- 1	Y =																
Distance from Initial Point																							
	1	704	b) (·		QN	z	- 1	1	1	 1	 	1	_			 _	 	 	 	<u> </u>		 _

OUTSIDE

INSIDE

RECORDER

0.47

260/

TIME

1042

0.47

FOPM31 / DEC 87

0.47

WEIGHTED M.G.H. G.H. CORRECTION

MEASUREMENT NO. COMPILED BY CHECKED BY	ä
STATION NAME SOUTH FIRST OFFEE (SWO8CDZ)	- 1
МАУ 3 19 89 РАЯТУ УК + В S NIDTH NIDTH В В 19 89 РАЯТУ В В 19 В В В В В В В В В В В В В В В В	8
47	2
SPIN BEFORE MEAS. MEAS. PLOTS WADING, UPSTR., BOWNSTR, SIDE BRIDGE 40 FEET, MILE, ABOVE, BELOW GAGE, AND	181
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	
FLOW WNIFCAM WEATHER SUNNY	
ОТНЕЯ ————————————————————————————————————	<u> </u>
GAGE 5000 SHAPE WATER 505 of @	
RECORD REMOVED N INTAKE FLUSHED L	
OBSERVER	

	-	-			_						<u> </u>	 -
F		OUTSIDE	0.50	0.50	0.50	0 50	0,50)			0.0	2/1
		INSIDE	1									
	ADINGS	RECORDER	07.0	0.50	0.60	0.60	05.0				0,50	2
	GAGE READINGS		BEFORE	Dure, NE	۳	1.7	AFTER					
a.H. OF ZERO FLOW		TIME	0915	0060	0935	0630	0935		WEIGHTED M.G.H.	3.H. CORRECTION	CORRECT M.G.H.	

			Cooks 6:00 D													
Discharge			Looks													
Area	,82	98	0,86													
Velocity	0 1	0 1	0													
Time in Seconds	:: @	0 //	0,,			0.86										
Revolutions	44	0,45	.45			000	-									
Depth	0	11	0 =			FINAL										_
Width	(2)	Λ(z)	h(2)			1										
Distance from Initial Point	0400	2760	0930													
		~~~	Q	 	 			 				 	 	 		 

FULLINE

3

VAPE14710~

FOR

REMARKS CHECK ING

CLEAR

CONTROL

MEASURE MENT

প্

G.H. OF ZERO FLOW_

STAT 1031 REW 1.8 END 1108 LEW = 14.5

MEASUREMENT NO. COMPILED BY CHECKED BY

75 19 89 PARTY BS. SOUTH FIRST CREEK 57168 STATION NAME

(w8003)

DG. DISCH. G.H. CHANGE NO. SECS AREA METHOD DATE WIDTH

HRS.

SER # NN6349 METER TYPE 6 URLEY 4625 PY 6M / SPIN BEFORE MEAS. 40 AFTER 42.

MEAS. PLOTS 8 DIFF. FROM R. WADING, UPSTR, DOWNSTA SIDE BRIDGE 40.2

RATING 2 FEET MILE, ABOVE, BELOW GAGE, AND MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

SUMMI BREEZY (0%0) _ |∓@ | AIR 65 WATER 55 FLOW 1416H - NOW. UNIFORM WEATHER WILLER OTHER SOMEEDSE BACKWATER GOOD SHARE GAGE STAFF -

Ş DOUG GREW - RIU RECORD REMOVED OBSERVER

INTAKE FLUSHED L

oF@

DNSTRE OF CONTROL THEH FLOW FOR UNKNOWN PENSONS S 10 10 11-NoTet CEMENT CLEAKED SAGE OUT REMARKS_ CONTROL

20 0 677 OUTSIDE 127 00 1.23 INSIDE RECORDER er a 1.23 GAGE READINGS STAPT なため CND CND BRICKE 1020 MJ G.H. OF ZERO FLOW G.H. CORRECTION WEIGHTED M.G.H. CORRECT M.G.H. Si 8071 TIME (00)

	3	88	3 3	)								1														BN	77.2	<u> </u>	ų	275	
Discharge				1185	10	102'	18/	472	446	419	500	,575	,564	,095	182	60	) û	A.F.O	, 457	36	386	.3717	3/5	244	146	,034	N	\	19.23	0192	
Area				395	,500	5375			Ŕ	45S	,4KG	005'	376.	515	.53	1	S. Callin	.3	,29	362'	13/5	1335	355	1375	380	340	,093				
Velocity				. 30	,30	513	ME	3775	,825	005'	1.05	50.1	1.075	1.35	5/2'/	52917	1.525	1,775	1,5B	52211	522 /	721.1	,900	,65	512'	001'	52/.				
Time in Seconds	B	0	89 68	40	40	40	40	40	40	9.0	0.4	0+	40	40	40	40	5	40	40	40	40	40	40	40	40	40	97				
Revolutions	0	0	8/9/8	4	12	14	72/129	25元	33	36	42	42	43	54	5/	59	101	16	63	49	9	45	36	36	15	A	Y				
Depth	/,	,35	the sale	bh',	1.00	1,15	1.30	1.22	1.08	.93	197	1.00	1,05	1.03	1,07	,80	.75	79	25'	Ŕ,	63	167	. 70	. 75	. 76	1	18.	-			
Width	, 25	05'	.50	,50	50	,50	150	.50	0.5'	,50	05'	,50	,50	150	150	50	,50	,50	150	,50	,50	,50	.50	99,	,50	,50 m	20,28				
Distance from Initial Point	8'1	13	218	3.0	3.5	4.0	4.5	5.0	5,5	6.0	6.5	0.0	2.5	18.0	8,5	0'6	9.5	10.0	10.5	11,0	11.5	12.0	12.5	13.0	13.5		14.5				
			1	1			-	₹	7		>- >\			107 107	<u></u>				3	$\overline{w}$	Z	2	<u>,                                    </u>	\$	7	4	5	_	$\overline{}$		_

FOPM31 / DEC 87

BWI DROKWATCH

MEASUREMENT NO. COMPILED BY CHECKED BY	Distance from
STATION NAME SOUTH FIRST CREEK (SW09003)	
19 82 PARTY J	1230
METHOD 200 MM FUND SECS NA G.H. CHANGE IN 5 HBS	
<del> </del>	1335
OIFF ISTR., SII	1249
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	1202
FLOW LOW-MOD WEATHER WARM, SUNNY, IT WIND	
OTHER GO THE JO THE JONE	
60° ° 60 / 6	
RECORD REMOVED NES INTAKE FLUSHED LAND	
OBSERVER	
CONTROL V- NOTEH WETE	

GH OF ZEDO ELOW					
an: of the provide				ţ	
	1040				
	GAGE HEADINGS	ADINGS			
TIME		RECORDER	INCIDE	LOCAL	
1228		0.410	TOID!	OUI SIDE	
1245		840		01.0	
		01.0		1.42	
WEIGHTED M.G.H.					
TOTOGOOD IT					
G.H. CORRECTION					
CORRECT M.G.H.					

Discharge	LONG													
Area	nu	6915	6915	6113										_
Velocity	200	9	.0	0= 1		100	2							
Time in Seconds	FLUME					7/6	011							
Revolutions	MONITO	40	07	17.40			2							_
Depth	1/80	2	0	= 0.		0	1							
Width	57467	V	7											
Distance from Initial Point	1230	1235	1949	1202										

PEMARKS_

MEASUREMENT NO.  COMPILED BY CHECKED BY STATION NAME  DATE  ### APPLANCE  WIDTH  WIDTH  WIDTH  WIDTH  WARTHOD  WATHOR  WARTHOD  WARTHOD  WARTHOD  WATHOR  WARTHOD  WATHOR  WARTHOD  WATHOR  WARTHOD  WATHOR  WATHO	CONTROL CEMENT V- NOTEH 30' UPSTREAM
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------

FT		OUTSIDE	0.13	0.13						
		INSIDE								
	ADINGS	RECORDER		0,73						
	GAGE READINGS									
G.H. OF ZERO FLOW		TIME	13:35	1343			WEIGHTED M.G.H.	G.H. CORRECTION	совяест м.в.н.	

FOPM31 / DEC 87

Discharge				the state of the s		0113		0115	0110	443													
Area		E W			`	100		5	0-0	5													
Velocity		FLUM			7	3	- 6	3		3													
Time in Seconds		HIM			2	#	Ŕ	100.68 7	4						6/10	,							
Revolutions		00/	K	0.0		0.03		107	1	1.01				AK		3							
Depth		707	WATE	7 7 11		"				D = 1				R NA	- -	100	3						
Width		SE																					
Distance from Initial Point		1335		1336		1338	1342	1212	77:1	1240													
	1	2/1/2	s;		!	ON :	Z			1	1	_	1		1	1			 	 	 	 	

REMARKS

MEASUREMENT NO. COMPILED BY CHECKED BY
STATION NAME SOCIETY STOVER ( SLUOSOOS
DATE 87265 7/26 19 87 PARTY 762 566, 6.9.0 WIDTH 760 0.22 DISCH. 10
METHOD F/62/23 & NO. SECS G.H. CHANGE C IN HRS.
METER TYPE SPIN BEFORE MEAS. MEAS. PLOTS WADING. UPSTRCTXXXVINSTR 2 SIDE RRINGE WADING. UPSTRCTXXVINSTR 3 SIDE RRINGE WADING. UPSTR 3 SIDE RRINGE WADIN
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION
FLOWLERS UNIFOR WEATHER CORREST PARTY Cloudy
OTHER AIR SE F@ /4455
GAGE WATER 65 oF@ 14495
RECORD REMOVED 1/C
OBSERVER

G.H. OF ZERO FLOW			14			
GAGE RE	GAGE READINGS			CR10 X.C.	X	
TIME	RECORDER	INSIDE	OUTSIDE			2
7625			227			N
						3
						5
						v
WEIGHTED M.G.H.						
G.H. CORRECTION						
CORRECT M.G.H.						

Discharge																		
Area		7.30	01,151	5/1/11	1450	1	14	20,										
Vetocity						e feit	5, 6	(e = ,		`.	2							
Time in Seconds		CFS	10801	1001	1001	الم ي د د د د د د د د د د د د د د د د د د	P. S. 1	> 3/2 FL	.30	8		2	4	O	0			
Revolutions	۲) د					to Je	XC 20 0	K 40	0		37.	2556		00	0000	1 1		
Depth	17/2	1 C.	117	8/,	8/,	5.45	50 X	2740	1	1	2 / / 0	1		5	7 0			
Width	0 000						- F Tu	201	1 71	7		Ý						
Distance from	N		14	# N	# 3	70.8	16,0	72 Kz.				101/10						

(1500)

CONTROL CENEST WINGTEL

REMARKS FE

MEASUREMENT NO.  COMPILED BY  CHECKED BY	≝ <u>-                                   </u>
STATION NAME SICUOSOCS S. 15t Creck	
DATE         \$ 22 72         \$ 29         19 59         PARTY         \$ 60.0.00         \$ 0.00           WIDTH         1000         AREA         VEL.         6.H.0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00 <td><u> </u></td>	<u> </u>
METHOD /= /4/01 C NO. SECS G.H. CHANGE O' IN HRS.	1 ^
METER TYPE SPIN BEFORE MEAS.  ** DIFF, FROM RATING WADING, UPSTR. BOWNSTR, SIDE BRIDGE 30. FEET, MILE, ABOVE. BELOW GAGE, AND	1 1 1 1 1
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	141
FLOW/sice, Uniferm WEATHER C/Con Commen	1, 4
OTHER AIR & S T F@ 12 4/C	
GAGE 120 WATER 18.3 % 1230	
RECORD REMOVED INTAKE FLUSHED L	11/
OBSERVER	-

CONTROL CENEAT U-noteh aven	0-1 to.	otch	0,000	
REMARKS Berin	1/655 messement To	ويروريهم	to ac	Fe-11
georgies &	5 - Suspended Sed. Sangle	of Soch.	ande	to Iten
G.H. OF ZERO FLOW				F
	GAGE READINGS	ADINGS		
TIME		RECORDER	INSIDE	OUTSIDE
WEIGHTED M.G.H.				
G.H. CORRECTION				
CORRECT M.G.H.				

Discharge						1242																					
Area		1126		552/	52	1786		1246				8/2: -		1/6													
Velocity			- 70				20		176	5,		1/1/2		145c				ر ل									
Time in Seconds		Y.	5950	550	`	5780.	0643	1050	C170	11 0 >	)	to at	>	2		, /	164)	6 43 6		34427	252	5/9	000	590	000		
Revolutions	9	4					0/			af Li		10 1		XX	J	ا ت ، کا	21/6	100		1 , 34	3,5		7 7	c /2.			
Depth	F-/4,	7 7		٤/,	,	1	41.	il.	61.	c 44	· 	16,10		oth a		16	136	,6/,		X	)						
Width	200									161	(	10		de	>	٠, چ٠	. 2/8	10=		2							
Distance from Initial Point	10,0			#/#	- 1	# 2		# 3	-	Yek		700	>	10 to						00							

MEASUREMENT NO. COMPILED BY CHECKED BY	75				Dist
STATION NAME STATION	108000	5.	Stiner	Y	
DATE 87272 WIDTH	65 CP	PARTY VEL.	G.H. Wen & D	DISCH 16 E	
METHOD F/27	Elenc No. SECS	G.H. CHANGE	VGE	IN HRS.	^
METER TYPE SPIN BEFORE MEAS. AFTER MEAS. PLOTS % DIFF. FROM WADING: UPSTR, DOWNSTR., SIDE BRIDGE	AFTER W DIFF. FROM STR., SIDE BRIDGE	RATING	MLEKA <u>BOVE</u> , BEI	RATING (FEET) MILE (ABOVE) BELOW GAGE, AND	4 14
MÉASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	XCELLENT (2%), GOOIS: CROSS SECTION	D (5%), FAIR (8%)	, POOR (OVER 8	%), BASED ON	174
FLOW CHAZ HALL	form	WEATHER CLESS	0/10	; ;	
ОТНЕВ	-	AIR	\$ \$ 40	1322	1/7
GAGE		WATER	о ^д о		
	RECORD REMOVED		_ INTAKE FLUSHED	U ED L	7
OBSERVER					11/
					_
CONTROL					İ
REMARKS ( )	1655 m	12 60 500 3 D	Jest t		
G.H. OF ZERO FLOW	an stage	>ce/m	607 500	Je Talle	
	GAGE READINGS	ADINGS			
TIME		RECORDER	INSIDE	OUTSIDE	
					 <del></del>
					i
					-

Distance from Initial Point	Width	Depth	Revolutions	Time in Seconds	Velocity	Area	Discharge
10	3	m /	- lan	9			
		1 / N	1	ر بي د		7.20	
#/		010		0750.		14/00	
#2		10		.0320		1405	
. C #		0/,		0.5/5		11/0(	
				L L			
10×2	100	27.7	26		X	250	5
76,2 6	G.F. F.	Se 20	Ker S. C.	it Si	1 /	8%,	
10 /2	200	273	J. H	50 13	2,50	,, "	2/
	· [C	1	1,	1280			
		1					
	\$77.	5 - 2	10 1/2	100			
	h =	0/,	7	0720	C RS		
	-						

FOPM31 / DEC 87

WEIGHTED M.G.H. G.H. CORRECTION

MEASUREMENT NO.  COMPILED BY  CHECKED BY		Distance from Initial Point	Wid
STATION NAME PEORIA INTERCEPTOR (SWILLOI)  DATE 89116 4/26 1989 PARTY (12, LB, KH			
WIDTH AREA VEL. G.H. CHANGE  LON F TH ROATED  METHOD FLUME NO. SECS MA G.H. CHANGE	HRS.	(	128
METER TYPE WA AFTER WA SPIN BEFORE MEAS. WA AFTER WA MEAS. PLOTS SUPERFORM RATING WADING, UPSTR COWNSTR, SIDE BRIDGE 30 (FET) MILE, ABOVE BELOW GAGE) AND	AGE AND	707	7 2
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	SED ON		14
LOW - UNIFORM WEATHER C			
OTHER 20 F@ 1010 GAGE 574 FF WATER 50 OF 1010	0 0		9
RECORD REMOVED INTAKE FLUSHED L			
OBSERVER			
CONTROL MEMARKS			
G.H. OF ZERO FLOW	<u>-</u>		
GAGE READINGS			
PDER INSIDE	OUTSIDE -		
1125 8906, 200, 72			

Velocity Area Discharge		FLUME													TAINTALLED PERMIT TASK					
Time in Seconds				1 1											BEEN CAIR	1				
Revolutions	1 1	THROATED	0.900	,	0.150	12		70						ı	5 20					
Depth		10NB	11		Ú	0	1	7	10/0											
Width		USED	- 705	(	30/	7	111	(	4-											
Distance from Initial Point			707	- 1	. ///														•	

FOPM31 / DEC 87

WEIGHTED M.G.H. G.H. CORRECTION

MEASUREMENT NO.	ä
CHECKED BY PLO P. A. T. M. C.	=
7/1	-
DATE 89201 /20 19 84 PARTY 6- 04 WIDTH NA AREA NA VEL. NA GH. 0.69 DISCH. 0.150	- 1
NGE	
	1 1
MEAS, PLOTS BILL FROM RATING WADING, UPSTRE, DOWNSTR, SIDE BRIDGE 30 FEET, MILE, ABOVE, RETOW GAGE, AND	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	<del></del>
FLOW LOW LOWIFORM WEATHER WARM & SUMNY	<u> </u>
ОТНЕЯ 418 °90 °F® /7/5	1
METAL V-NOOTH WEIR WATER 65	4 1
RECORD REMOVED ##RLIER INTAKE FLUSHED L NO	1
OBSERVER	<u> </u>
	1 1
CONTROL V- NOTCH WEIR & 25 UPSTREAM	
REMARKS	-

G.H. OF ZERO FLOW				FT
	GAGE READINGS	ADINGS		
TIME		RECORDER	INSIDE	OUTSIDE
0111				0.69
17(9		0,0		0.69
1727		69.0		0.69
WEIGHTED M.G.H.				
G.H. CORRECTION				
CORRECT M.G.H.				

Width Depth Revolutions Time in Seconds Velocity Area $K = 0.0000000000000000000000000000000000$	Discharge	VEL 510	010	200						
Width Depth Revolutions Time in Velocity  SET 200 PM + LUME 2A  M = 0,17  C	Area	HANN		0.1	570					
SET 200 MM FLUM  SET 200 MM FLUM  N= 0,17  N= 0,17  N= 0,17	Velocity	1 2		[4] [7]	0.1					
Width Depth A = 1	Time in Seconds	W/			U	<b>&gt;</b>				
Midth Deg	Revolutions	MM O.1	0.17	0.17		14 C				
	Depth		1 1 1	ا"اارا		111				
1219   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   1793   17	Width	567								
	Distance from Initial Point	9/21	1719	1733						

MEASUREMENT NO. COMPILED BY CHECKED BY				Distance fror
STATION NAME SWILLOW DESCRIP	Late	Peoria Intercenter		10.0
MIDTH 87222° 9/27 19 8.2. WIDTH COMM AREA	PARTY CO	19 8.2 PARTY GR JG SC	555 DISCH, 04/82	
METHOD JELLOS C. NO. SECS	G.H. CHAN	G.H. CHANGE TO, O.C. IN 1/2 HRS.	N. S. HRS.	1
METER TYPE SPIN BEFORE MEAS.  ***DIFF. FROM MEAS. PLOTS  ***DIFF. FROM WADING, UPSTR.COOMNSTR SIDE BRIDGE ACCOUNTE. ABOVE. BELOW GAGE, AND	RATING FEET, M	ILE, ABÓVE, BELC	W GAGE, AND	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	6). FAIR (8%),	POOR (OVER 8%	), BASED ON	K
FLOW Coers WEATHER	No ch	WEATHER POLLY MENTY, WAS ILLS SIL	C1255/20	1/2
ОТНЕЯ	AIR 18	07270 PP 1820	いんせく	
GAGE O.72	WATER	\	7926	32
RECORD REMOVED		U INTAKE FLUSHED <u>L</u>	D	
OBSERVER				
CONTROL Meter/ U-notch	2010			
REMARKS FEE / SECONDAINS				
G.H. OF ZERO FLOW			14	
GAGE READINGS	GS			Dex
TIME	RECORDER	INSIDE	OUTSIDE	
		-		

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WEIGHTED M.G.H. G.H. CORRECTION

# R. L. STOLLAR & ASSOCIATES

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DISCHARGE MEASUREMENT NOTES

MEASUREMENT NO. COMPILED BY CHECKED BY

INTERCEPTOR STATION NAME HAVANA

DISCH. 1.468 G.H. CHANGE _0,01 IN 0.5 HRS. 246 VEL 0.592 G.H. NA AREA METHOD FLAW METER NO. SECS AP21 8.4 DATE TIOI WIDTH

PYGMY CURRENT NO;NNB343 #625 GURLEY METER TYPE CURLE SPIN BEFORE MEAS. 44

MEIEH IYFE
SPIN BEFORE MEAS. 444 AFTER AI/A
MEAS. PLOTS % DIFF. FROM
WADING, UPSTR. DOWNSTR. SIDE BRIDGE ACCEPT, MILE, ABOVE, BELOW GAGE, AND

40 HISTAN HIMES MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION 17 45 mph MODERATE WEATHER PARTLY SUNNY AIR 35 6 FLOW LOW OTHER

U INTAKE FLUSHED L NO RECORD REMOVED NONE OBSERVER

oF@_

WATER 45

INSTALLED

GAGE NONE

15. BLOCKAGE DOWNSTREAM CAUSING BACKUP BRIDGE WHICH SPANS KUM BUBBLER UNDER DOWNSTREAM REMARKS DIRECTLY CONTROL NONE  $\bar{\omega}$ 

G.H. OF ZERO FLOW

	OUTSIDE	7	7					
	INSIDE	75.	,52	15.				
		•						
GAGE READINGS	RECORDER							
GAGE								
	E					M.G.H.	CTION	A.G.H.
	TIME	5151	1530	1545		<b>МЕІСНТЕ</b> М.С.Н.	G.H. CORRECTION	CORRECT M.G.H.

10.95 1600 SEN

7 Area Discharge (27) (27) (27) (27) (27) (27) (27) (27)	
2000, 192, 192, 192, 192, 192, 192, 192, 192	
Velocity 25 + 25 + 25 + 25 + 25 + 25 + 25 + 25 +	
Seconds 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
Revolutions   O	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
with the transfer of the state	
Distance from Initial Point In	

R. L. STOLLAR & ASSOCIATES

RE

1325

BEGIN END

REM

DISCHARGE MEASUREMENT NOTES KHE DERKO MEASUREMENT NO. COMPILED BY CHECKED BY

DISCH. . 36 HRS. Z I Apr. 26 19 89 PARTY KH JK LB
AREA 1000 VEL. 5.80 G.H. NA
INO. SECS 50 H H JA Ver 84116 DATE WIDTH

SW 11003

HAVANA INTERCEPTOR

STATION NAME

SPIN BEFORE MEAS. 49 AFTER NA RATING BELOW GAGE AND BELOW GAGE AND HEAT HOW GAGE AND HEAT HOW GAGE AND HEAT HOW GAGE AND HEAT HOW HEAT HOW GAGE AND HEAT HOW HE HOW METHOD

HUWS-O OMM 17-1324 1324 INTAKE FLUSHED L °F@__ _ ₽ |ñ Ú AIR 75 WEATHER SUNNY WATER RECORD REMOVED LOW UNIFORM OBSERVER NONE OTHER . FLOW GAGE

RECORDER 06 STAFF 50 LOW FLOW NONF CONTROL REMARKS

GAGE READINGS G.H. OF ZERO FLOW

GAGE READINGS
METSURED WTH

			. 1	١٨			S	ı	2	7	2	ı	1 1			ı	1	1	1	λ	10	. 1	1	1	1	1	ı	1	1 1	1 !	
Discharge	С	Q	0	,02625	.0304S	2040.	200500	2840'	,046875	SL59HO.	519540.	6420'	ତ	9	0	0	0				13,	000									
Area	С	210.	080,	ZH0'	450'	990.	690.	Kro.	.075	690.	590.	450,	000	,000	. 000	, 000	000.				15	202									
Velocity	0	0	0	. 625	519.	.10	,725	.60	.625	569.	.725	.45	٥	٥	0	0	0		1	1,600	200										
Time in Seconds	40	40	40	40	чо	40	40	40	40	40	40	40	40	0 <del>/</del> 1	5	40	0 70														
Revolutions	0	0	0	25	27	28	5-8	h7	52	27	29	$\bar{\omega}$	0	0	٥	0	0														
Depth	0	0.04	0.10	4.0	91.0	0.22	67.0	0,24	0.25	0.23	0.21	81.0	0,13	0.11	50.0	0.02	0 200														
Width	0.15	6.3	0.3	6,0	6.9	6.9	0,3		ů,	6.9	0.3	6,0	0,3	0.3	0,3	0.3.	I.														
Distance from Initial Point	2,2	2.5	2.8	3.1	3,4	5.6	4. 0.4	4.3	4.6	7.9	5.2	5.5	5.8	1.9	ē.	6.1	2.0														

MEASUREMENT NO.	Distance fron
STATION NAME HAVANA INTERCEPTOR 11002	
DATE 8920/ 730/6 19 89 PARTY TO 31/2 DISCH 0.30 DISCH 0	1 1
METHOD 300 MM FUNE, SECS NA G.H. CHANGE O IN S HRS.	1630
SPIN BEFORE MEAS. PATER NATIONAL OF STREET NATIONAL	1635
WADING, UPSTR COWNSTR, SIDE BRIDGE 2360 FEET MILE, ABOVE GELOW GAGE, AND BURNE LONG	1639.
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	7/1/17
FLOW LOW - SEMI-UNIFORM WEATHER WARM - SUMNY	(240)
отнея <u>90 тө</u> 1640	1-647
GAGE NOWE INSTALLED WATER 70 OF 1640	11/2/1
RECORD REMOVED NAME FLUSHED L NO	1
OBSERVER	1699

G.H. OF ZERO FLOW				E		- 1
	GAGE READINGS	ADINGS				1
TIME		RECORDER	INSIDE	OUTSIDE	T	Η,
29	VEPTHOUFKE			0.323	12	3
1921	CRID	0.2305				.
						ı
						1
						ı
						ı
WEIGHTED M.G.H.						i
G.H. CORRECTION	:					i
CORRECT M.G.H.						1

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	Discharge	KAK3			10		1														
3.4	BOIC	of STR		I S	1.334	301	7	7 6	2010	2/0/2	-l										
Vibodio		H	1	2	2 = 6	1		X ,	2/5	0:0	3										
Time In		FLUME		7										1.70							
Revolutions		BOOM	0/0	5	21	25		1]	9 t)	SK.			41	4	3						
Deoth		J.		7	10	11	1/1/2		D 211	1× C			FINAL	· (	1						
Width		36		,																	
Distance from		1630	77.77	6607	.6891	649	1.1047		1601	166	, ,					1000					
		22			9 .										B	E	 	- j-	_	 1	$\equiv$

APPROX 75 FEET

NONE ANSTALLED

Q MEASURED &

END OF CONCRETE

CONTROL NONE

REMARKS Q

Discharge

Area

Velocity

Time in Seconds

Revolutions

Depth

Width

1.20 C

4500

CES

Lec X Lum

1600bx

5000

1030

1950C

10.25

14900

 $\wedge$ 

Distance from Initial Point		0000	1 #	#2	\sqrt{\pi}		10,70-	18	3	70 har			
MEASUREMENT NO. 725 COMPILED BY CHECKED BY	STATION NAME SWILL OCZ HOWWOOLL SIFETS CIZES	DATE 89270 9/27 ,1982 PARTY 5/2 TG 5/2 S	NO. SECS G. H. CHANGE	METER TYPE SPIN BEFORE MEAS. AFTER MEAS. PLOTS	2) OC	FOLLOWING CONDITIONS: CROSS SECTION  FLOW Control Cont	OTHER AIR Z F@	GAGE DESCHOLLE LASSIGN 112 & WATER OF®	RECORD REMOVED 1/2 INTAKE FLUSHED L 2/2	OBSERVER	CONTROL GLACIC & hande /	REMARKS Fall Sampling, Merseucement made	100' Selow the end of Personete when a

1 2 2 1 1 2 2 1 1 1 2 2 2 2 2 2 2 2 2 2			672		
xesof sill	50° - 77°	-,581 =,33	/c- /ne = 0.2	.25.297 .98.547 .5.728	050.00
Kright of	10 1-10 J	755.77	cuer Six A		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
1034 To 75-	ED 14/2	made	OUTSIDE DE 25	6470	

INSIDE

RECORDER

GAGE READINGS

G.H. OF ZERO FLOW

TIME

WEIGHTED M.G.H. G.H. CORRECTION

CORRECT M.G.H.

STACT: 1028 570P 1048

VI (2)

LOCKIN downstrain

RATING FEET, MILE, ABOVE, BELOW GAGE, AND 87110 119 ST PARTY JK 36 1.92 VEL 2.40 G.H. UM G.H. CHANGE NA 52006 PO SPIN BEFORE MEAS. 47 AFTER 45 MEAS. PLOTS % DIFF. FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE 40 STATION NAME LLYALDA DITZH C AREA NO. SECS_ METER TYPE Py6MY SPIN BEFORE MEAS. 47 MEAS. PLOTS %. APRIL 20 000 MEASUREMENT NO. COMPILED BY CHECKED BY METHOD WIDTH

DISCH. 0,324

IN D HRS.

WEATHER SUNDY V 65% NO WING, SL. CLOWDY MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION FLOW LOW, UNIFORM

INTAKE FLUSHED L NONE of@ 1030 -4@-1030 29. AIR WATER 55 NONE RECORD REMOVED OBSERVER OTHER GAGE

REMARKS GOLDING VERY SOFT, SINH, BANK OF VARACKE WITH - DISCHARGE INSTALLED TAKKN IN LINGIN PARTON CHANNEL NONE G.H. OF ZERO FLOW CONTROL

Н

OUTSIDE INSIDE RECORDER GAGE READINGS 1030 St G.H. CORRECTION WEIGHTED M.G.H. CORRECT M.G.H. TIME

Discharge	000	000	000	82	025	880	033	0.038	p.0049	2.030	1.50.1	140	200	000	000	000	000	000.	
ã	$\perp$	0	0	0	0	6	0,0	0	0	0	6	0	Ċ	0.0	2	0	0	0	
Area	0,000	0.045	4800	\$60.0	6600	0,123	0,130	0.120	0.150	6.150	0.153	051.0	147	8910	441.0	901.0	0.037	0.015	
Velocity	0,000	0.000	0.000	0,025	0,350	0,235	21E.0	0,300	0.325	0.300	0,375	0,275	0,150	0,000	0.00	0.000	0000	0.000	
Time in Seconds	٥	dЬ	٥h	70	40	40	45	40	40	40	40	40	45	ИÜ	НО	40	240	40	
Revolutions	٥	O	0	,	70	Ġ	11	7/	6/	8	7.5	"	. •	٥,	0	0	0	0	
Depth	8	1.5	78	133	53	,,	, dp	142	150	.50	,51	150	147	56	8 5	35	15	5	
Width	St. 51.	,30	30	(30	38	30	.30	30	30	130	30	130	R	427	'ځن	30	3025	01.	
Distance from Initial Point	2,1'	3,4,	3.71	70%	33,	3 6	.3.9'	4.2	4.5'	481	7/5	541	5.71	6.0	6.31	6.6	16.9	7.1	

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0.326

5

04.00

____FATING _____ FEET, MILE, ABOVE, BELOW GAGE, AND 4/2.5 19 55 PARTY S.4.65 , C.232 , T.C3 AREA VEL. G.H. G.H. MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION IN HRS. F@ 150-5 OUTSIDE WATER C C OF STYC INTAKE FLUSHED L 1.00 INSIDE WEATHER CITCES AIR . OC G.H. CHANGE RECORDER GAGE READINGS RECORD REMOVED 755 STATION NAME SECTION NAME METHOD FLOOR C NO. SECS. CONTROL CONTROL 82268 1 v MEASUREMENT NO. COMPILED BY CHECKED BY G.H. OF ZERO FLOW REMARKS TIME OBSERVER GAGE DATE WIDTH OTHER . FLOW

				Time in			
Point W	Width	Depth	Revo	Seconds	Velocity	Агва	Discharge
			4				
		66		CÁS		7.00	
		30		2552		7455	
		15.		8/152.		15051	
		18.		,2748		15.10	
	3	40 14	neker	ence	7.03	15	
9	170	30%	3	VO	2	u S	3
3	2	1 cf	120	13 76.	, = 0 5	3.2	
120	7.1	25.	1	7			
			12/2	708			
				1 1			

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G.H. CORRECTION

CORRECT M.G.H.

WEIGHTED M.G.H.

START = 1520 REW END = 1547 LEW

3,30

DISCHARGE MEASUREMENT NOTES R. L. STOLLAR & ASSOCIATES

WY89 #1 MEASUREMENT NO. COMPILED BY CHECKED BY

12005 UNALDA South 89080 STATION NAME

3/21 19 89 PARTY TK LB
AREA 138 VEL. 380 G.H. 3,85 DISCH. 2/20
NO. SECS 39/40 /4. CHANGE O IN 5 HRS. 4.00' METHOD DATE WIDTH

FEET, MILE, ABOVE (BELOW GAGE) AND METER TYPE PYGM Y NO.625
SPIN BEFORE MEAS. 55 AFTER 15
MEAS. PLOTS %DIFF. FROM RATING WADING, UPSTR. COWNSTR), SIDE BRIDGE 50 FEE

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION GOOD - WARM SUNNY LOW - MOD/UNTFORM WEATHER OTHER FLOW

INTAKE FLUSHED (C) NES 009/ @± %F@ AIR 45 WATER_#5 5 RECORD REMOVED CONO GAGE STAFF - 6000

OBSERVER

WEIR - 30' UPSTREAM OF NEAS PT. HAS METAL SHEETING カインし REMARKS Q LOCATEON CENENT EAST CONTROL

G.H. OF ZERO FLOW

3.85 OUTSIDE 3.85 3.85 3.85 INSIDE RECORDER 3.85 3.85 3.85 GAGE READINGS G.H. CORRECTION WEIGHTED M.G.H. соявест м.с.н. 8891 1520 1547 TIME

Discharge	0.00	0000.0	0.013	0.050	0.035	1400	6.034	0.038	0.000	0.016	0000	0.000	0.000	00000		070	)								
Area	0.030	0.000	990'0	6600	0.075	0.078	0.084	0.087	0.000	0.018	8.063	0.063	0.057	0.048	1	1910	0,100								
Velocity	0,000	0.000	0.20	0 533		0 567	0.400	0,433	0,400	0.233	1000	0.000	0.000	0000	100	1000									
Time In Seconds	Ø	8	40	30	30	E	30	30	30	B	30	98	200	Ø											
Revolutions	Ø	Ø	8	91	/4	11	12	(3	12	7	R	0	0	0											
Depth	.13	126.	. BZ	18,	.25	96.	%	139	,22	133	. ٦/	is	61.	61.											
Width	<i>51</i> ·	.8	.30	,30	, 30	.30	,30	<i>OE</i> .	.30	.30	,	&	.30	.25											
Distance from Initial Point	2.35'	2,65	3.95	3,25	3,55	3.85	4.15	4,45	4.75	5.05	5.35	5.65	5.95	6.30											

R. L. STOLLAR & ASSOCIATES

DISCHARGE MEASUREMENT NOTES	14 80 W
DISCHARGE MEASUREMENT	MEASUREMENT NO. COMPILED BY CHECKED BY

DISCH. 0. 299 IN 1.0 HRS. 3/21, 19 89 PPARTY LB 07 AREA CART VEL 6.310 GH. \$.85 12005 5 74 right CHANGE SOUTH UMUDA NO. SECS 049 84080 riow 6 4.0 STATION NAME METHOD DATE WIDTH

PYGMY # 625 METER TYPE KEAS.

SPIN BEFORE MEAS. SE AFTER 45
MEAS. PLOTS SEDIFF. FROM RATING HEED MILE, ABOVE, BELOW GAGE, AND

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

WEATHER WARM, SUNNY, LT BREELE 000/ @so a09/ @± AIR .45 WATER 45 6000 - conp 100- NOU GAGE STAFF -OTHER . FLOW

INTAKE FLUSHED 50 RECORD REMOVED

OBSERVER

Ŝ HAS METAL SHEETING -30' UPSTREAM WFIR LOCATION LEMENT BANK REMARKS ( CONTROL

G.H. OF ZERO FLOW

GAGE	GAGE READINGS		
TIME	RECORDER	INSIDE	OUTSIDE
1554	3.85		3.85'
1606	3.85/		3.851
143	3.85		3.85
WEIGHTED M.G.H.			
G.H. CORRECTION	,		
CORRECT M.G.H.	3.85		3.83

	Discharge	0.000	0,000	0.017	0.646	0.046	0,00,0	6.032	0.053	6.029	0.017	0.00	0.00	0.000	0.000		0000	+							
	Агва	1,624	690.0	0,075	0,087	0,87	1800	0,082	0.084	0,072	0.075	0.069	0.063.	750.0	8000		1	296.0							
60	Velocity	0.000	0,133	0.233	0.533	0.533	0.567	0.367	0,633	004.0	6.233	0.033	0000	0.000	0000'0		020								
į	Time in Seconds	Ø	30	30	30	30	Œ	30	E	8	30	B	R	R	30										
	Revolutions	Ø	4	7	9/	91	21	//	61	13	2	/	Ø	Ø	ø.										
	Depth	٠/2	.23	50'	Bi	<i>36.</i>	.27	.29	.38	34	, 25	.23	77	1.18	61'										
6).	Width	3.	ģ	. 30	.30	8	. 30	.30	,30	8	Ė	.30	Ė	.30	.20										
2,20	Uistance from Initial Point	2.40	2,70	3.00	3,30	3.60	3.90	4,30	24.50	4.80	2,16	5.15	5.70	6.0	6,30										

STAKET 255 3.81 EW

REW 1.8

USTREAM

FINISH 1331

R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

MEASUREMENT NO. COMPILED BY CHECKED BY	HY John White	₹ 					
STATION NAME	SOUTH UNALDA	UVALDA	2W	5W/2005	2		
DATE 89/07 WIDTH 4.1	H//j7 AREA	19 89 P.	543	SH OF	1 k	17 19 89 PARTY SG KH JK AREA 84619 VEL. 542 G.H. 3/81 DISCH. 0.353	
METHOD $FLOW(0.6)$ NO. SECS.	(a) NO. SECS	140.	G.H. CHANGE	IGE .		IN HRS.	
METER TYPE PYGMY CURRENT METER (GURLEY) #625 NO. NN 6349 SPIN BEFORE MEAS. 60 8C. AFTER 52 8C	1 CURREN	T METER	CGURLE	4) #b2	S. NC	2, NN 6349	
MEAS. PLOTS % DIFF. FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE	% DIFF. FROM NSTR., SIDE BRID	NM RIDGE	-	IILE, ABO	VE, BEL	TING FEET, MILE, ABOVE, BELOW GAGE, AND	
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	EXCELLENT (	2%), GOOD (5%)	, FAIR (8%)	, POOR (C	OVER 8°	%), BASED ON	
FLOW LOW -MO DERATE	DERATE	WEATHER	SUMN	W.W.	7 0	WEATHER SUMNY, WIND 4 5mph	
ОТНЕЯ			_ AIR	AIR 60 4@ 1248	₽. @	1248	
GAGE			WATER 55 OF 1248	25	oF@	1248	

G.H. OF ZERO FLOW			FT
	GAGE READINGS		
TIME	RECORDER	ER INSIDE	OUTSIDE
1203	ENERGY S. S.C.		3.82
1254	3.81		3.81
1321	18'8 *		3,81
1331	18,6		3.81
WEIGHTED M.G.H.			
G.H. CORRECTION			
CORRECT M.G.H.			

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Distance from Initial Point	Del Willings	Depth	Revolutions	Time in Seconds	Velocity	Area	Discharge
	しななながら	£/h va	0.0	ОН	000	000'	0,0
2+ pe		18. 18.	to with				
な、な	0,2	81,	Ы	40	475	.036	1110
2.4	2.0	81,	الد	40	. 525	.036	10189
2,0	0.2	0:50	57	40	1 625	.040	,025
2.8	2,0	0,22	27	40	519.	,04U	1620,
3.0	2,0	0.18	20	04	.50	980'	810.
3,2	0.25	0.17	77	04	. 55	52 ho.	5755.201
3,5	0.3	0,17	16	04	04.	150.	,0204
3.6	0,3	0,18	23	Oħ	0575	,c54	23105
4.1	0.3	0.10	7.4	오	09,	860'	\$870
7	0,3	8110	23	40	.515	,054	30180.
4.7	0,3	0.0	22	40	,55	450'	.0297
50	0,3	0,18	74	40	د	,054	.0324
5,3	6.0	6.14	23	04	.575	,042	51420'
5.6	6,0	6110	9	40	0,40	150	8270.
0-	0,15	0,00	٥	Ho	000.	000	000'
					/	14,	0.352
					0.543	0:0	
				-			_

INTAKE FLUSHED L

STEPHENSON

PAUL WATTE, BRAD

OBSERVER_

RECORD REMOVED

COMPILED BY CHECKED BY
STATION NAME S. CLYPLAGE (SW12005)
DATE 11 4 /21 19 84 PARTY JR 85 WIDTH VILL GH. 3.84 DISCH 0.76/K
METHOD TO UNIVERSITY G.H. CHANGE O IN HRS.
METER TYPE ~ A AFTER SPIN BEFORE MEAS. ~ A AFTER
14 75
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION
FLOW SEM! - UNIFORM WEATHER D. CLOUDY
ОТНЕЯ
GAGE OK WATER 55 OF 1530
OBSERVLR $RTL$

G.H. OF ZERO FLOW	3.43			ŢŦ
	GAGE R	GAGE READINGS		
TIME		RECORDER	INSIDE	OUTSIDE
(525		3.84		3.84
1550		3.84		3.84
1635		3.84		3.84
WEIGHTED M.G.H.				
G.H. CORRECTION				
CORRECT M.G.H.		3.84		3.84

Discharge				M			
Area				0 2	H2 (4)		
Velocity				29 -	515		
Time In Seconds		eree )		2.0 =	92.0		
Revolutions	1715 C	OF TUBE.	12	672	70		
Depth	70 P OF 20 P OF	dat	- R	. 0	11		
Width	= #4	he=(	1 - H	0.901	0.23		
Distance from Initial Point							

W/ 0.66 LONG THROATED

time

REMARKS 15T

FLUME

07

CONTROL

RATING FEET, MILE, ABOVE, BELOW GAGE, AND DISCH., STA IN 5 HRS. MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION INTAKE FLUSHED L NO VPSTREAM WATER 60 OF 1340 85 F@ VEL. CHT KH Sw12005 WEATHER 600 L, SUNNY 301 G.H. CHANGE AIR . APPROX 20 METER TYPE NATER N RECORD REMOVED SOUTH UNGUDA WEIR Cord METHOD 200 MM FULMS SECS 190 FLOW LOW-UNIFORM - NOTEH post, MEASUREMENT NO. COMPILED BY CHECKED BY GAGE STAFF STATION NAME OBSERVER _ REMARKS CONTROL OTHER _ WIDTH DATE

					<u>.</u>
	GAGE READINGS	ADINGS			_
TIME					-
		RECORDER	ROISIN	TO STITLE	-
1549		2000		COLSIDE	_
102		2.68		×200	
1530		380		1 20	
		000		3,88	-
	-		•		
			1		-
					-
					_
					_
	_	-			_
WEIGHTED M.G.H.					
GH COBOCCTION	1				!
ant Connection		-			
COBBECT					_
COUNTED M.G.H.		7.R			
	-			-	_
				_	

G.H. OF ZERO FLOW

Discharge	1   ~							177	1000										
Area	NOT		HANNEL					14	0							-			-
Velocity	O MM		N CH					9	+									-	+
Time in Seconds	200	(1)	7					100						<u> </u>					+
Revolutions	US (NG	FUME	FLUNCE	0				1			+						1		<u> </u>
Depth	RED	HROATED	dn	10	K	35	0 34	77			.							-	-
Width	ME434	1116	38	NF	1 1	2 N	7	FINA				+				1		-	_
Distance from Initial Point			1325	1330	1335	1340	1345	6267					-						
		7		_						 		 -	1	 1	<u> </u>	!	<u> </u>	  -	

.

MEASUREMENT NO. COMPILED BY CHECKED BY	70				Distan
STATION NAME SOUT	-6 Chicalde	Sul	5413005		~
DATE 8226.9/20 WIDTH 260.00 SECS	9/26 ,19 5.7 AREA V	PARTY 75 (7) VEL. G.H. CHANGE	G.H. 557	VEL. PARTY 7-6 (5-2) S-5-65 VEL. S.L. DISCH. 1-2 G. IN HRS	
METER TYPE SPIN BEFORE MEAS. AFTER MEAS. PLOTS "DIFF. FROM WADING, UPSTR-ADOWNSTR-, SIDE BRIDGE	AFTER "% DIFF. FROM OWNSTR:3,SIDE BRIDGE	RATING 3C FEET, A	AILE, ABOVE, 6	RATING 30 FEET, MILE, ABOVE, BELOWIGAGE, AND	# #
MEASUHEMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	CELLENT (2%), GOO CROSS SECTION _	O (5%), FAIR (8%)	, POOR (OVER	8%), BASED ON	#
FLOW/2-12 , 2/11, Perm		WEATHER / Comment		5,600	
ОТНЕЯ		AIR	.	Ф СУЗСУ	4
GAGE	RECORD REMOVED	WATER CT.	1 💥	F FLUSHED L	Mg
OBSERVER					To
CONTROL CENTEST	t (1-10 fc.	45 61C			
REMARKS FC//	Sangli	- 5			
G.H. OF ZERO FLOW				Ld	
	GAGE READINGS	ADINGS			
TIME		ЯЕСОИДЕЯ	INSIDE	OUTSIDE	10

Discharge						25										
Area		7136	0760	5150	092C	2 1.0	0	,0%.								
Velocity						40.50	6, =	500								5,3
Time in Seconds		CFS	.28/3	1708,	.30/7	27620	2511	17 +4	150	2514	170F8	 26	00	ίλ ₀	0	l'in e
Revolutions	7 e	(7)				# ceke	1003	240		. = 5	. 30	13177	080%	0	0.00	4.38/6
Depth	177	200	75.	52'	75,	440	2	140	5-, 6/0	2 /	- 22	2	~ >	٠,	0	200
Width	1,41					(6,3)	f +4,5	de	7,0	, 70	1 2	<b>*</b>				1740
Distance from Initial Point	002		1#	# 2	43	Tota	160 c	Toxal				C. O. C.				76

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WEIGHTED M.G.H. G.H. CORRECTION

 MEANURE MENT NO.
 75

 COMMILE BY
 75

 CHECKED BY
 75

 STATION NAME \$\frac{2\lambda 2}{222} \frac{2\lambda 2}{322} \frac{19}{19} \frac{\frac{2\lambda}{2}}{8\frac{1}{2}} \text{PARTY } \frac{7\lambda 6\lambda 2}{6\lambda 1.5\text{C}} \text{DISCH.../Z}

 DATE \$\frac{85222}{2\lambda 2} \frac{2\lambda 2}{2\lambda 19} \frac{19}{2\lambda 1} \text{VEL.}
 G.H. CHANGE \$\frac{2\lambda 2}{2\lambda 1} \text{IN HRS.}

METHOD F/G/MC NO. SECS G.H. CHANGE IN HRS.

METER TYPE
SPIN BEFORE MEAS.

MEAS. PLOTS

MEAS. PLOTS

WADING, UPSTR. COWNSTR., SIDE BRIDGE

WADING, UPSTR. COWNSTR. COWNSTR., SIDE BRIDGE

WADING, UPSTR. COWNSTR. COWNSTR., SIDE BRIDGE

WADING, UPSTR. COWNSTR., SIDE BRIDGE

WADING, UPSTR. COWNSTR., SIDE BRIDGE

WADING, UPSTR. COWNSTR., SID

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

FLOW ON REALLY (1/2, FC), WEATHER (1/2, C), C)

OTHER

GAGE

RECORD REMOVED

MATER

U

NATER

NAT

OBSERVER

CONTROL Cemest U-netch were

REMARKS (Zerla) flass messeren ent

Terl semplins

G.H. OF ZERO FLOW

 TIME
 GAGE READINGS

 TIME
 NSIDE
 OUTSIDE

 WEIGHTED M.G.H.
 G.H. CORRECTION
 CORRECT ION

Discharne	PA III							10	7																		
	-		$\perp$		-	_		 1	$\downarrow$			4						_	4	$\perp$	_	1	_	_	_	_	_
Area		,	11:00	1515			5757	11		= , 90		213			(4)	`											
Velocity								1		11.		Tuse			=1/8		CAS										
Time in Seconds		Į.	(*5	122/	1737	7	1727	7770	الا	Jat		7/10	1.72		.72:		1727										
Revolutions	ume		( )					fret	,	1 × 1	` ;	THE	,53,		12/1		1111										
Depth	2 E	,	7)4	8/,	3/.	/ 9	8/.	440		Kise		160	1.50		1		7:=9										
Width	ou o							200		y yo		2/0	`	1/1	7					-01							
Distance from Initial Point	20			# /	7 #		# 3	10/2		des	1	10/20							0	3							

MEASUREMENT NO. TA TA CHECKED BY TA 20024	89222 9/22, 19 8-9 PARTY 500 75 BOCMM AREA VEL. G.H. 1600 E DISCH. 1/1	METER TYPE SPIN BEFORE MEAS.  **DIFF. FROM MEAS. PLOTS  **DIFF. FROM WADING, UPSTR, DOWNSTR, SIDE BRIDGE  **ACCUPATION CONDITIONS: CROSS SECTION  **ACCUPATION CONDITION CROSS SECTION  **ACCUPATION CONDITION CROSS SECTION  **ACCUPATION CONDITION CROSS SECTION  **ACCUPATION CROSS SECTION CROSS SECTION  **ACCUPATION CROSS SECTION CRO	WEATHER CLEAN WARM	AIR 80 4@ 1643	WATER oF@	RECORD REMOVED INTAKE FLUSHED L	
MEASUPEMENT NO. COMPILED BY CHECKED BY STATION NAME S 2	DATE 892 WIDTH 200	METER TYPE SPIN BEFORE MEAS. MEAS. PLOTS WADING, UPSTR, (DO MEASUREMENT RATE MEASUREMENT RATE	FLOW	ОТНЕЯ	GAGE	OBSERVER	

	  - 		 	- -	 	 	  - 	  - 		
		OUTSIDE								
		HINSIDE								
	GAGE READINGS	RECORDER								
	GAGE RI									
3.H. OF ZERO FLOW		TIME						WEIGHTED M.G.H.	G.H. CORRECTION	CORRECT M.G.H.

Discharge									150%													
Area			Line	0011	1705	0,7,	1		36 =	105,		. 29.										
Velocity									c tu	1		2//2				(2)	270					
Time in Seconds			545	1007	.1137	11/27			>00000	To To		1.5		- 126		,,,,	17511					
Revolutions	2 6							(	of cef	\(\frac{\frac{1}{3}}{2}\)		CAG		125	1/6	3	(1	1				
Depth	Fle	\	0	5/,	5/1	17/:			25.4	X 0 X		246	(	150	1 / 0		17/2					
Width	8 8								1/6	x to		de			-		X					
Distance from Initial Point	200			/ *	#2	# \\	1 1		Tet	100	6	10/20										

1055

REMARKS (% 1.2)

CONTROL

G.H. OF ZERO FLOW_

MEASUREMENT NO. COMPILED BY CHECKED BY	76		9729 9 929	
STATION NAME 5	12006 SI	SW120089	M 90024	#a
WIDTH S1222	AREA 19 85 V	PARTY 7c	5 620 F	DISCH. 10
METHOD Flex	Len C NO. SECS	G.H. CHANGE	NGE	IN HRS.
METER TYPE SPIN BEFORE MEAS	AFTER WOIFF. FROM VSIR-SIDE BRIDGE	RATING	AILE ABOVE, BI	 ING FEET MILE ABOVE, BELOW GAGE, AND
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	EXCELLENT (2%), GOO 4S: CROSS SECTION	D (5%), FAIR (8%	), POOR (OVER	8%), BASED ON
FLOW Lead Mi	21 Form WEA	WEATHER C/ca	20 /06	2000
ОТНЕЯ		AIR	60 A	1608
GAGE		WATER	%-P-	
	RECORD REMOVED		INTAKE FLUSHED	SHED L
OBSERVER				
CONTROL				
REMARKS (	Mess	265500	( (, )	<b>x</b>
FE-11 S	Sam alas			
G.H. OF ZERO FLOW	)			FT
	GAGE READINGS	ADINGS		
TIME		RECORDER	INSIDE	OUTSIDE

Discharge			3						70%		) D									
Area		1 1	(im	0/2/	5/9/	2/9/	ľ		× = >	, 50	,28									
Velocity									o the	3 11.	3///5				2					
Time in Seconds	V	1 1	54	5883	1001.	1007			2000	5 70	2011		,77	, 0.	727	7 CF3				
Revolutions	1600							·	Doc.	402	2436	}	79	1	`	00/.				
Depth	5	7//	777	,/2/,	,/3	13			526 67	8	7401		5 - 5			. 13 =				
Width	ر دیم ر								1/2	S Zu	de	2	0,7	(	, 70	1 =				
Distance from Initial Point	200			#/	#2.	# >	)		Tota	762	To ta									

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WEIGHTED M.G.H. G.H. CORRECTION

EWAGE TREATMENT PANT SW24(  AREA 19 PARTY LB KT  NO. SECS NA- G.H. ANA DISCH.  NO. SECS NA- G.H. CHANGE NA IN  AA AFTER NA  ** DIFF. FROM  VSTR., SIDE BRIDGE NA FEET, MILE, ABOVE, BELOW GAA  EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASI  SIS. CROSS SECTION  AIR 70 FF (100)  AIR 70 FF (100)  WATER LOVO  NATER LOSHED L	SEWAGE TREATMENT  AREA 19 PAF  AAA AFTER NA G  WA AFTER NA BAT  WINSTR., SIDE BRIDGE AJA  DEXCELLENT (2%), GOOD (5%), F  ONS: CROSS SECTION  RECORD REMOVED  W	CAPILED BY TECKED BY TO THE CKED BY
AREA 19 PAE  NO. SECS NA- VEL.  AAA AFTER NA- G  % DIFF. FROM WSTR., SIDE BIDGE NA EXCELLENT (2%), GOOD (5%), F IS: CROSS SECTION FORM WEATHER  W  RECORD REMOVED  W	AREA (19 PAE.  NO. SECS NA- VEL.  AAAA AFTER NA AFTER NA RAT ASTER, SIDE BRIDGE NA AFTER SECTION  EXCELLENT (2%), GOOD (5%), FASTER SECTION  FORM WEATHER  W  W	SEWAGE TREATMENT PLANT SWAY
NO. SECS NA- G  AAATER NA  WA AFTER NA  WA DIFF. FROM  STR., SIDE BRIDGE AJA  EXCELLENT (2%), GOOD (5%), F  SIS. CROSS SECTION  WATHER  WEATHER  WECORD REMOVED	NO. SECS NA- G  AATER NA  WA AFTER NA  WATER, SIDE BRIDGE NA  EXCELLENT (2%), GOOD (5%), F  SIS CROSS SECTION  FORM WEATHER  W  WEATHER  W	AREA
AA AFTER NA ATTER NA ASTER NO ASTER SECTION SECTION WEATHER WEATHER RECORD REMOVED	AAAFTER NAAASTER NAAASTER SECELLENT (2%), GOOD (5%), FOOL WEATHER BECORD REMOVED WATER NATURE	NA- G.H. CHANGE NA IN
ENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON I CONDITIONS: CROSS SECTION  NO. NE  NO. NE  NECORD REMOVED  NO. INTAKE FLUSHED  NO. OVER 1000  NO. OVER 10000  NO. OVER 10000  NO. OVER 10000  NO. OVER 10000  NO. OVER 1000	ENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON CONDITIONS: CROSS SECTION  VILLA L'ALFORM WEATHER COOL PT CLOUDY  AIR 70° F@   (00  WATER LOOP OF INTAKE FLUSHED L NO	AAAFTER VA "% DIFF. FROM RAT VSTR., SIDE BRIDGE AJA
WEATHER (2001, PT CLOVOY  AIR 100   WATER 100   WATER 100   U  OND INTAKE FLUSHED L	WEATHER (2001, PT CLOVOY  AIR 70 € FG     0 0  WATER 1000 oFG   11 0 0  DRD REMOVED N 0 INTAKE FLUSHED L	ENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON CONDITIONS: CROSS SECTION
10 NE FECORD REMOVED NO NO STEP 100 U U U U U U U U U U U U U U U U U U	10 N E	
WATER 100 oF   1100 INTAKE FLUSHED L	WATER 100 oF@   100 U D D D D D D D D D D D D D D D D D D	0011 gg 400, AIR
RECORD REMOVED NO INTAKE FLUSHED L	RECORD REMOVED NO INTAKE FLUSHED L	WATER LOUP OF
		N N INTAKE FLUSHED L

		55.		.33					
FI		OliTelor	2013100		-				
		ACISN	700						
	ADINGS	RECORDER							
<b>4</b> N	GAGE READINGS								
G.H. OF ZERO FLOW		TIME					WEIGHTED M.G.H.	G.H. CORRECTION	совнест м.с.н.

|--|

FIGURE

B

BUCKET METHOD

REMARKS USED CFS

CONTROL

MEASUREMENT NO. COMPILED BY CHECKED BY

RATING 774 FEET, MILE, ABOVE, BELOW GAGE, AND MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION ACCOUNTS Ş 1959 PARTY GPD TG. SEG. AIR: 85 40 1430 11- NONG INSTALLED WATER 23,3 % 1430 Sewage Treatment Plant U INTAKE FLUSHED L FLOW MED. - NOW ON THORM WEATHER JOUTH CLOUDS G.H. CHANGE NONE - REENTON BASIN RECORD REMOVED 11/7 METER TYPE LASSIN BEFORE MEAS. LASSIN BEFORE MEAS. LASSIN BEFORM LASSING, UPSTR., DOWNSTR., SIDE BRIDGE. NO. SECS LIF-SEWMER TRT 9/27/89 AREA STATION NAME SWAYCOL Volomotric 2832 OBSERVER SEC CONTROL METHOD OTHER _ WIDTH

110 12 00 15 9C H 9					
CIT. OF SENO FLOW			į	ti	-
	GAGE BEADINGS	ADINGS			
Lenth					<u> </u>
IME		RECORDER	HASIDE	OUTSIDE	
	•				
					<u> </u>
					<u> </u>
					1
WCO CHECK					<u> </u>
WEIGHTED M.G.H.					
G.H. CORRECTION					_
CORRECT M.G.H.	-	~			
				_	

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Cacharge	1.																															
	19	L	77.72										JE 45 2																			
	$\mathbb{L}_{\mathcal{Q}}$	ì -										21 4775	ı																			
	9		1		1467		4014		1465	1906/		17.70	DISCL																			
	Schon	DICHANT	39 500				36 50		18 Sec	14000		A2150	Tille																			_
	VC D	74	1.		124		100h		inc	AV!		1215E V	777-11-11-13																			_
	penote	1.0 %	4901	/	4901	5	100/		7 308	yesh		T215CE	#																			
	101																															
		Wometric Discharge MAGASINETINE	Complex DSCharge MEASURENE	Hometric Discharge MEASCHRENELLI 4921 Ren 39 sec	Geneture Descharge MEASURENEUM TAKING OF DESHALLE PIPE WILL PORT	Lounetric Discharge MEASONEMENT 4gal per 39 sec 1403	4 gal per 38 xx (1403	Howether DScharge MEASURENT 4gal per 39 sec 1403 4gal per 38 sec 1403	4 gal per 38 xc 1405	4 gal per 18 sec 1465  4 gal per 38 sec 1465  4 gal per 18 sec 1465	4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 18 sec 1465  4 gal per 18 sec 1465	4 gal per 18 sec 1405  4 gal per 18 sec 1405  4 gal per 18 sec 1405	4 gal per 18 sec 1406  4 gal per 38 sec 1405  4 gal per 18 sec 1406  4 gal per 18 sec 1406  4 gal per 18 sec 1406	12000 PSC POSC PORTE TO BUTCH OF THE PASCON FUNE UT AGO PORT TO DESCRIPTION OF THE PASCON FUNE UT AGO PORT TO THE PASCON FUNE OF THE PASCON FUNE O	1200 AND SCHOOLE MEASON FUELT  4901 AND 38 SC 1465  4901 AND 38 SC 1465  4901 AND 18 SC 1466  4901 AND 1400 1405  4901 AND 18 SC 1400  TONGHADER VARIED TO MEASURED THE	4 gal per 18 sec 1405  4 gal per 18 sec 1405  4 gal per 18 sec 1405  4 gal per 18 sec 1406  5 sec 1405  7 sections of 2100 - or 11 sect 12 111976  ### 14 december 12 111976	4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 18 sec 1465  4 gal per 18 sec 1465  5 secionare valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mart 12 mare 17  A constraint valice — on mare 18   12 1921 201 38 20 1405  4 921 201 38 20 1405  4 921 201 38 20 1405  4 921 201 18 50 1405  Testingue Valier	1901 AN 38 SC 1405  4901 AN 38 SC 1405  4901 AN 38 SC 1405  4901 AN 1400 1405  TOUGHAINE VARIED - 1 MAIL 12 MAYER  TOUGHAINE VARIED - 1 MAIL 12 MAYER  TOUGHAINE VARIED - 1 MAIL 12 MAYER  TOUGHAINE TARK DISCOURTS OF CARACUSE	1900 FULL DISCHARGE MEASOREMENT  4901 AM 39 80 1405  4901 AM 38 80 1405  4901 AM 1400 1405  4901 AM 1400 1406  THENDER WASTED - NICHT TO INTORE  THENDER WASTED - NICHT TO INTORE  THE WELMITTELL DISCLIPERED WEARINGTHE	1 yal 200 38 200 1405  4 yal 200 38 200 1405  4 yal 200 38 200 1405  4 yal 200 18 200 1405  4 yal 200 18 200 1405  5 200 1405  6 200 1400 1720	4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 18 sec 1465  Tescendare valie	4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 38 sec 1465  4 gal per 18 sec 1465  Teschnows valie — — unt 12 ming c  Teschnows valie — — valie — — ming c	492 420 38 xc 1405 492 420 38 xc 1405 492 420 38 xc 1405 492 420 1420 1406  Tasimare VASIEU TICHTE IT WEALLE IN	492 420 38 xc 1405 492 420 18 xc 1406  Tousingure VARIED Touring 17 117946  A WILLWALLTELL DISCRIPTION WEARINGENTE	492/ 201 38 sec 1465 492/ 201 1420 1465  492/ 201 1420 1465  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1420 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 1466  700/ 201 146	492/ AU 38 xc 1465  492/ AU 38 xc 1465  492/ AU 38 xc 1465  492/ AU 18 sc 1465  Thistipane Added — Discubility Washing  A wind fill Discubility of the transfer to the transfe	12 motor D'Schonge M'EASONEMENT  490 And 38 xc 1465  490 And 38 xc 1465  490 And 1400 1406  This in the Till Disculber Wedenseine  # Very Alie Till Disculber Wedenseine	490 AN 38 xc 1405  490 AN 38 xc 1405  490 AN 18 sc 1405  490 AN 18 sc 1406  Then the Time 12 mit 12	492 AN 38 SC 1465  492 AN 38 SC 1465  492 AN 1426 1465  492 AN 1426 1465  492 AN 1426 1465  492 AN 1426 1465  4 SC 1465  5 SC 1465  6 SC 1465  6 SC 1465  6 SC 1465  6 SC 1465  7 SC 1465	4 gal per 38 xc 1405  4 gal per 38 xc 1405  4 gal per 18 sc 1405  4 gal au 14 ac 1405  † Veruntur Tell Discriber Werturelle	4921 AU 38 SC 1465 4921 AU 38 SC 1465 4921 AU 1422 1465 4921 AU 1422 1465  TEACHAILE AND THE THE THE TO WE ASSESSIVE	

MATER

RFFLUENT

REMARKS

WY 84 #3 MEASUREMENT NO. COMPILED BY CHECKED BY

4-6-19 89 рапту LB 72 - АЯЕА 3.537VEL, 20094 G.H. 4.47 DISCH 0.323 NORTH FIRST CREEK (SW77) METHOD WETER NO. SECS 30 01 G.H. CHANGE 6.00 STATION NAME WIDTH DATE

# 625

METER TYPE ///U/C

MEAS. PLOTS BEFORE MEAS. #8 AFTER #9
MEAS. PLOTS #DIFF. FROM RATING MED MILE, ABOVE, BELOW GAGE, AND MEDING, UPSTR, DOWNSTR, SIDE BRIDGE #0 REED MILE, ABOVE, BELOW GAGE, AND

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

U NTAKE FLUSHED L NO FLOW LOW- MODERATE WEATHER WARM, SUMUY, WINDY SURFACE AIR 65 WATER 50 3 RECORD REMOVED _ 401 UPSTREAM OTHER WIND RIPPIANG GAGE STAFF

OBSERVER

REMARKS APPLOX 40 DOWNSTREAM, AREA FULL OF -NOTCH WEIR 1 35' UPSTREAM VEGETATION, VEG REMOVED - NO EFFELTS CONTROL

G.H. OF ZERO FLOW

OUTSIDE , Lh 0 0.47 0.47 INSIDE RECORDER 0,47 0.47 0.47 GAGE READINGS WEIGHTED M.G.H. TIME 1510 1522 1530

Discharge	0.000	0,000	0.000	0.000	0.000	0.00	0.000	0,000	0.017	1600	0.086	0.052	0.044	0.014	0.013	0.000	0.000	0.000	0,000	0,000	0.000	1	1.333	l l					
Area	0,042	0.0	0.136		0./80		1500	0.840	0,352	94G.0	0.234	0,285	0.333	0.210	0.189	0.171	0.150	4 <b>~</b>	0.120	0.087	0,000		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1,00,0					
Velocity	0000	000	0000	0000	0.000	0.00	0.000	ago	0,067	0.367	0367	0.233	0.200	0.067	0.067	0.033	0.00	0,000	0.00	0.000	0.000	1	1600						
Time in Seconds	Ø	B	30	30	30	છ	B	30	30	30	30	B	30	30	B	R	30	8	30	30,	8								
Revolutions	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	8	11	//	7	9	B	B	1	Ø	Ø	ø	Ø	Ø								
Depth	801	.33	.H.	.51	09,	.70	,77	8	148°	,83	,78	1.75	///	02'	£9'	.57	.50	64'	04'	129	00.								
Width	9/′	,30	ŝ,	.30	130	.30	30	30	.30	.30	33	.30	.30	.30	. 30	.30	.30	.30	,30	,30	5/.								_
Distance from Initial Point	3.15	345	3,75	4.05	4.35	4,65	4.95	6,25	5,55	5.85	6.15	6,45	6.75	7.05	7.35	7.65	7,95	8,25	8,55	38.85	9.15								-

FOPM31 / DEC 87

0.47

0.47

G.H. CORRECTION

совнест м.в.н.

57007 FINISH -

John Co

J.V.

Ach 4/21/89

KE H MEASUREMENT NO. COMPILED BY CHECKED BY

4/21 19 57 PARTY CT. 420 BAKE AREA 8.705 VEL. 1.35 G.H. 0.47 DISCH. 313 NO. SECS 40 cach G.H. CHANGE + 0,01 IN /2 HRS. FIRST NORTH 24002 11168 6.3 METER TYPE STATION NAME METHOD WIDTH DATE

METER TYPE SOUNDS CHANNEY MOTER #625 NO.
SPIN BEFORE MEAS. 31 AFTER #6
MEAS. PLOTS % DIFF. FROM RATINGS MILE, ABOVE, GELOW GAGE AND SSPING, UPSTR., DOWNSTR.) SIDE BRIDGE #0 MILE, ABOVE, GELOW GAGE AND SS.

MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

SLIGHT BREEZE AIR . 75 F@ 1045 WATER HO OF 0 10 45 __ INTAKE FLUSHED_L WEATHER SUNNY 75°F WHITE JULIE STEPHENS Q Q _ RECORD REMOVED _ GAGE STEVENS TYPE F GAGE FLOW ADA UNIFORM, 10 W OBSERVER PAUL OTHER

consistently edge; measurement CONTROL STRUCTURE) meter turn right will not (CEMENT 0 Flow suspect as low flow CONTROL WEIR REMARKS Higher G.H. OF ZERO FLOW

OUTSIDE 0.46 410 14.0 0.47 다<u>,</u>이 INSIDE 0.40 0,46 0.47 RECORDER GAGE READINGS FINISH START G.H. CORRECTION CORRECT M.G.H. WEIGHTED M.G.H. TIME 1050 1128 1501 POLITICA 611

					<u> </u>	2/2		,- · <u>.</u>		·			1													
					ろれる	F											18	}						. !	 í	ı
Discharge	O	Ö	O	o		,0525	1.0427	,0434	3540.	1440,	0440.	,0 4 DY 25	0	0	0	1	/	0.8.								
Area	.025	,200	Ŋ	<b>₹</b> ⅓	74	,300	,244	342,	.200	252	320	147	621'	.074	.0015		3.705		-							
Velocity	0	0	0 1000	day O	4/10	511	511'	175	115	175	,200	,275	0	0	0		1	7.35%								
Time in Seconds	40	40	04	140	HO	пh	40	40	40	40	40	40	40	4	04											
Revolutions	0	0	0	0		7	7	7	7	L	8	11	C	0	O											
Depth	0.05	07'0	0,42	١. ١	09.0	0.60	0.01	29.0	0.65	69.0	0.55	0,42	14.0	0,28	0.05											
Width	0,0	0.7	12 SO. 14	5.0 x 0.5		9'0	4'0	4.0	4.0	4.0	0.4	0.35	0.0	0.3	0,15								·			
Distance from	7.8	2,0	-	1 1	11	4.8	4.4	4.0	3,6	3.7	2.8	7,4	٦,٠	3,1	1.5											

VEL. PARTY PO SIL GH. 0.79 BO (FEET), MILE, ABOVE (BELOW GAGE, AND O IN . 5 HRS. MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION INTAKE FLUSHED L ATO or@_ STATION NAME NOWTH 19 CALERIE SW 24002 AIR . 603 F. @ **クセン** WATER 504 G.H. CHANGE TIME S 3 _ WEATHER __ AREA 19 80 RECORD REMOVED_ METER TYPE NH. SPIN BEFORE MEAS. AFTER MEAS. PLOTS NOTE, FROM WADING, UPSTR. DOWNSTB, SIDE BRIDGE  $\mathcal{C}$ METHOD JODIUM FLUIME, SECS. REMARKS MEASY CING UNGORN CINA CONTROL ALKAR DATE 91 23 M DLY WIDTH MEASUREMENT NO. COMPILED BY CHECKED BY G.H. OF ZERO FLOW OBSERVER FLOW GAGE OTHER

	GAGE READINGS	ADINGS			
TIME		RECORDER	INSIDE	OUTSIDE	_
1005	BEFORE	0.52		0.52	
	DURING	0.52		0.57	
	1.6	0,52		0.52	
	1/	0.52		6.57	<u> </u>
WEIGHTED M.G.H.				,	
G.H. CORRECTION					<u> </u>
CORRECT M.G.H.		0.52		0.42	

				Ω														
Discharge				doce b														
Area		0,76	6.79	66.0														
Velocity	1		9,1	8					6									
Time in Seconds	•	0 1	$\omega$	3					0.7									
Revolutions		. 1	6. 4	0,4				1	3									
Depth	,	<b>시</b>	11 (2)	= (7				ļ	LINAL									
Width		2	¥	h														
Distance from Initial Point			1025	1030										•				

BY AFTH FIRST CREEK 3.	84135 5/15 1989 PARTY D, S ON 23 3.	MO. SECS # 675 P46 AFTER 43	MEAS, PLOTS  **DIFF. FROM  WADING, UPSTR. COMNSTR. SIDE BRIDGE  FEET, MILE, ABOVE BELOW GAGE, AND  STATES OF THE S	MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON M 5	200	AIR 75 FB 0950 BC 6.	STAFF - 6000 CONO. WATER 450 0FB 0950 63 4-	RECORD REMOVED NO INTAKE FLUSHED L NO		
COMPILED BY CHECKED BY STATION NAME	DATE 84134 WIDTH 319	METER TYPE GURLEY SPIN BEFORE MEAS.	MEAS. PLOTS WADING, UPSTR.	MEASUREMENT RATI	FLOW MOD-	ОТНЕЯ	GAGE STAFF		OBSERVER	

	STDAM.
	五石
	20412
CICHO?	Sciles exite
CONTROL	REMARKS

G.H. OF ZERO FLOW			·	13
	GAGE RE	GAGE READINGS		
TIME		RECORDER	HUSIDE	CUTSIDE
0430	BEFORE	0.43		0.93
10/6	1)	8,93		0 92
1021	STARI	26.0		0.90
1030	Q1W	76.0		0.47
1601	END	20.0		26.0
WEIGHTED M.G.H.				
G.H. CORRECTION				
CORRECT M.G.H.				

			,				1										10								,	
	Discharge	C	193	257	.317	,236	246	.224	371	57	820	225	044	,036	C		5.39									
	Area	C	099	156	189	1.89	189	183	081	196	,219	081'	921'	5601	0		1.986									
	Velocity	0	1.75	1,65	1.675	1.25	1.30	1.225	2,075	3,35	2.475	1.25	5510	0.475	0		1.345									
	Time in Seconds	Ø	40	40	90	40	40	42	40	3	2	40	40	40	<b>3</b>											
	Revolutions	Ø	OĻ	99	60	50	25	40	83.	134	<i>bb.</i>	50	/4	6]	0											
	Depth	0	.33	152	,63	,63	,63	19.	160	167	73	, 8	745	GT	0	•										
	Width	91'	130	.30	.20	,30	150	,30	20	.30	.30	,30	.30	8	. 15											
	Distance from Initial Point	3.0	3.3	3.6	3.6	4.2	4,5	4.8	5.1.	5.4	5.7	60	6.3	4.6												
_			ŵ	ñ	Ţ,	4	10/1		<u></u> 4,	8	9 6	<u>.</u>	<u>ğ</u>	-50	_			-	 							

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

RREEK - NORTH BOUNDARY - SULTH DISCH, 142 IN O HRS. G.H. CHANGE NA ITY JR PARTY VEL. 4/24 19 89 AREA METER TYPE AS AFTER AS ADEN SPIN BEFORE MEAS. WA AFTER AMEAS. PLOTS WIFF. FROM WADING, UPSTR., DOWNSTR., SIDE BRIDGE. FLUME NO. SECS NA 1 FIRST 4114 ~6.0 MEASUREMENT NO. COMPILED BY CHECKED BY STATION NAME WIDTH 200 mm. METHOD DATE 90025

RATING FEET, MILE, ABOVE, BELOW GAGE, AND MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION 1000 U INTAKE FLUSHED L _ _ __ °F@ □ 4000 29. AIR WATER 55 WEATHER COOL RECORD REMOVED INSTALED FLOW LOW / UNITORM NONE OBSERVER OTHER GAGE

CONTROL

REMARKS FLOW NOT STEADY, BACKIUS UP DUE TO

SHALLOW FANCING STRUCTURE

G.H. OF ZERO FLOW

 GAGE READINGS

 TIME
 RECORDER
 INSIDE
 OUTSIDE

 WEIGHTED M.G.H.
 CORRECTION
 CORRECTION
 CORRECT M.G.H.

Discharge																						
Area		INNE	302																			
Velocity		7 02	tow A	ł													,					
Time in Seconds		THROAT	BE TO	do HISM			6							CFS								
Revolutions		DNG	MAY	W SIH	1 1			•	.740		1001.			140								
Depth		155.116	-84NK	FOR			2		B =					u								
Width		9	_			7	44	2	- 70	4	115		(6		}							
Distance from Initial Point	ka						101	101	101													

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

MEASUREMENT NO. COMPILED BY CHECKED BY	Distance fro
STATION NAME (ST. CREEK & NORTH PLANTS (SW30003)	
DATE S9114 454 1989 PARTY JR LB WIDTH ~12 ST AREA VEL G.H. NA DISCH.  200 NM COW; THROFFE O METHOD FLUME NO. SECS. N/A G.H. CHANGE WA IN HRS.	
METER TYPE WA AFIER X/A SPIN BEFORE MEAS. Y AFIER X/A MEAS. PLOTS SIFER SPING WADING, UPSTR., DOWNSTR., SIDE BRIDGE FET, MILE, ABOVE, BELOW GAGE, AND	10
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	0
FLOW LOW- UNIFORM WEATHER LOOL, CLEAR, LT WIND	
ОТНЕЯ 60 4® //4S	
GAGE NOWE INSTALLED WATER 50 OF 1145	
RECORD REMOVED WA INTAKE FLUSHED LAA	
OBSERVER	

3.H. OF ZERO FLOW			1	
GAGE R	GAGE READINGS			
TIME	RECORDER	INSIDE	CUTSIDE	
			,	
WEIGHTED M.G.H.				
G.H. CORRECTION				
CORRECT M.G.H.				

AND VESETATION

REEDS

CONTROL

FOPM31 / DEC 87

	Distance from Initial Point	Width	Depth	Revolutions	Time In Seconds	Velocity	Area	Discharge
(SW30008)								
X, 13		USED	9N07 C		THROATED	FUUME		
G.H. WA DISCH.								
-	101	(	7 6 1		0	-		
	101	١	000	7	1.18			
MILE, ABOVE, BELOW GAGE, AND	TOT	- 77	30	1	580			
4), POOR (OVER 8%), BASED ON				3				
L. CIFAR IT WIND								
Sh/1 @ 00)		= 1		6	320			
i								
INTAKE FLUSHED LATE	)	0		197	0	, 5		
		+		,				
10 - 15' 11 DET DE AN								
יין איין איין								
14.								
INSIDE CUTSIDE								

45

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

MEASUREMENT NO.
COMPILED BY
CHECKED BY
STATION NAME
MISN' A

166331

METER TYPE

SPIN BEFORE MEAS. ALA AFTER NA
MEAS. PLOTS

MEAS. PLOTS

A.A. ** DIFF. FROM NA
MADING, UPSTB., DOWNSTR., SIDE BRIDGE

MADING, UPSTB., DOWNSTR., SIDE BRIDGE

FEET, MILE, ABOVE, BELOW GAGE, AN MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION WEATHER CLOUDY SYNCHOLOGY 1980EZ INTAKE FLUSHED L NO ** CAAS AIR. 565 FO CA35 DISCH. <u>Z</u>¹ 19 XSZ PARTY TC4, SE G4 (1812) WATER CO 36001 G.H. CHANGE N(C STAFF RIPE C (COUCEAR) RECORD REMOVED SEPTEMBER 29 METHOD BUCKET / MIRNO. SECS FLOW LONG LINGERAL BH511/A GAGE OTHER DATE

G.H. OF ZERO FLOW

GAGE READINGS

TIME

GAGE READINGS

RECORDER
INSIDE
OUTSIDE

WEIGHTED M.G.H.

G.H. CORRECTION

CORRECT M.G.H.

DISCHARGE MEASURE MENT WITH BUCKET + TIAIER, MEASURED JUST BEZOND WE IR

# 1 The A- Valocity Area  # 1  # 2  # 2  # 2  # 3  # 3  # 4  # 3  # 4  # 5  # 5  # 6  # 6  # 6  # 7  # 7  # 7  # 7  # 7	VOL . Dischange				6AC	12.81	141	540		2	50		45/2										1					1
# 1 Time it velocity  # 2  # 2  # 2  # 3  # 4  # 4  # 5  # 6  # 6  # 7  # 7  # 7  # 7  # 7  # 7					H	7	+	7		7.11 gpn	118500	5	0.015			-				-								<u> </u>
Width Depth Revolutions 38	-		_	-		_	-				٦	् क	1	i i	-		ļ.		$\perp$		-		_			_		-
Width Depth Revolutions 58	Velocity									759	5	520	20															
Width Depth Revolutions  ## A A A A A A A A A A A A A A A A A A	Time 2					47		XX		- 1			S. S. S.	200														
Midit Dep	Revolutions									haveo																		_
	Depth									dias															,,,			
Distance from Initial Point  O 9 3 5	Width			1	1	7.#		#3																				
	T) F( C Distance from initial Point			/004	6725																							

AT NOTER OF WELL

V KOTCH TAKEK

REMARKS TRISUNDER

CONTROL DIVETAL

OBSERVER

12.E.R

FIN 15H - 1453 JAR 1436

REW - 6,00'

### R. L. STOLLAR & ASSOCIATES

DISCHARGE MEASUREMENT NOTES
WARSUREMENT NO. WY 89 4 45 480 85/02/ MEASUREMENT NO. COMPILED BY CHECKED BY

37001 CREEK OFF-POST STATION NAME FJRST

DISCH ,285 IN CHRS. 4-7-1989 PARTY 48, 5K AREA 1.329 VEL. .332, G.H. .51 18, SK G.H. CHANGE FHETER NO. SECS 14 69997 400' METHOD DATE WIDTH

PYGMY CURRENT MOTER BURLEY # 625 METER TYPE 6.V. SPIN BEFORE MEAS.

SPIN BEFORE MEAS. 47 AFTER 47
MEAS. PLOTS
WADING UPSTREDOWNISTRYSIDE BRIDGE 40 (FEET) MILE, (BOVE) BELOW GAGE, AND THE STATE EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION

WEATHER WARM, WINOY OFERCAST NONE INTAKE FLUSHED L NO 1450 1450 4 (0) WATER 50° °F@_ AIR 60° RECORD REMOVED FACK CONO FLOW LOW - MOD GAGE STAFF-OTHER

NOT WORKING - UNDERLOW ROD SINKING 190S BOTTOM VERY # - FLUME STREAM REMARKS CONTROL

OBSERVER

G.H. OF ZERO FLOW

G.H. OF ZEHO FLOW				FT
	GAGE READINGS	ADINGS		
TIME	,	RECORDER	INSIDE	OUTSIDE
/435		NONE		0.51
LHH1		NONE		0.51
/453		NONE		0.51
		-		
WEIGHTED M.G.H.				
G.H. CORRECTION		×		
CORRECT M.G.H.		2		0,7,

Discharge	0.000	0,000	0.000	0000	280.0	190.0	0.046	190	030	03/	020	5.000	000	80	\	78x											
ä	Ö	2	B	0	0	0	0	-	6	0	0	0	0	00		0		L				L			_		
Area	0.000	0.02	0,090	5010	0.105	411.0	411.0	0.133	0.099	0.102	0.0911	180,0	1.087	0,038			1.329										
Velocity	0,000	0.00	$\mathcal{O}$	abb	0.367	0,533	0.400	0.500	9300	0.38	0,300	0,88	0,000	0.000		555	0.00										
Time In Seconds	33	30	30	30	30	30	R	30	30	30	30	30	30	30													
Revolutions	Ø	$\mathcal{Q}$	Ø	Ø	.∞	91	(2)	15	9	6	6	ø.	Ø	Ø							-						
Depth	Ø	15°	130	.35	,35	,38	.38	<i>(b)</i>	,33	134	,32	128	1,39	61'													
Width	,20	8	.30	,30	.30	,30	.30	130	130	30	130	96.	.30	0,01													
Distance from Initial Point	3,8	2.35	2,65	2.95	3.25	3.86	3.85	54.15	4,45	4.75	5.05	535	5,65	600	,											-	

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

O

795 25+45

> METER TYPE (Youn Your Form) SPIN BEFORE MEAS. 3.7 AFTER NOWE MEAS. PLOTS % DIFF. FROM RATING WADING NESTRADOWNSTR., SIDE BRIDGE 3.0 FEET, MILE, MAOVE BELOW GAGES AND DISCH. 0.328 HRS. MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION WEATHER WAKM, BREEZY ~ 50°F INTAKE FLUSHED L 64 1645 OF@ 1645 CREEK -OFFPOST 3700 1. Brailland G.H. 0.52 DIS . 4® | FLUME 19 87 PARTY FE, H. ž AIR 80 WATER 7 neter t RECORD REMOVED NOW FUWETIONAL recenda F1857 youry Current NO. SECS_ AREA FLOW Low - unitarm STATION NAME NUKTH 84110 MEASUREMENT NO. COMPILED BY CHECKED BY Ġ. 7:1 GAGE Staff OBSERVER CONTROL METHOD OTHER DATE WIDTH

GAGE READINGS	ADINGS		
	RECORDER	INSIDE	OUTSIDE
			0,52
			0,52
			0,52

ᇤ

G.H. OF ZERO FLOW

REMARKS

Discharge	0.00	20.08	1 7	0.033	0.040	0.050	0.0HO	0.043	0.048	0.033	20.0	0000	0.000	0.000				30%	0.2								
Area	00000	0.000	6.0%	990'0	0.066	0.066	0.063	990.0	0.066	0.006	000	0.063	0.045	000.0				97.									
Velocity	0.000	0000	00C.0	009.0	0.600	0,750	5090	0.650	6.725	0.500	0.000	0.000	0.000	0.00		6	485										
Time in Seconds	40	40	40	40	40	40	40	40	40	3	40	40	39	10													
Revolutions	0		12	20	24	30	25	26	2.9	70		o	0	0													
_		12308	.23	, 22	,22	.22	12.	27.	77.	. 22	.23	12,	115	Ó													
Width	-15	. 30	, 30	, 30	30	, 30	,30	.30	X	ķ	, 30,	.36	A. 30	a 530	.13												
Distance from initial Point	3,7	4.0	4.3	¥.6	4.9	5,2	5,5.	5.8	6.1	6.4	6.7		7,3	7.6													

FINESH =

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

STATION NAME FIRST (198ER OFF-POS) (3/001)
DATE 89/23 5/3/, 19 89 PARTY (TK, BS) WIDTH WIDTH G.H. DISCH.
METHOD JORAN JUME NO. SECS NOT G.H. CHANGE IN HRS.
SPIN BEFORE MEAS. WA AFTER NA
MEAS. PLOTS " DIFF. FROM WADING CABOYE, BELOW GAGE, AND WADING CAPSTB., DOWNSTR., SIDE BRIDGE 40 FEET MILE (ABOYE, BELOW GAGE, AND
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION
FLOW LOW UNSTARM WEATHER GOOL, SL CLOUDY, LT DING
ОТНЕЯ
GAGE STAFF - 6000 STAPPE WATER 55° 0F@ 1055
RECORD REMOVED INTAKE FLUSHED L
OBSERVER
CONTROL NOWE - FLOWS UNDER STATIONARY FLU
REMARKS

G.H. OF ZERO FLOW			FT
GAGE R	GAGE READINGS		
TIME	RECORDER	INSIDE	OUTSIDE
1045	500		10.6
4501	500		15.0
1059	5000		95'0
1104	500		0,56
1109	500		0.27
h///	05.5		0.53
WEIGHTED M.G.H.			
G.H. CORRECTION			
CORRECT M.G.H.	669		

•							
Discharge	50 00		0				
Area	414°	, 2	. 54				
Velocity		0					
Time in Seconds	30 st.		#	900	0hP		
Revolutions	0.	1 60 60	-0.33	0,0			
Depth	(2)		(2)	05 5 00 00 00 00 00 00 00 00 00 00 00 00			
Width	4	7 4	74/			TANK 1	
Distance from Initial Point	4901	k011	#11#	10	3		
			9				

095 = OUT OF SERVICE

### R. L. STOLLAR & ASSOCIATES DISCHARGE MEASUREMENT NOTES

MEASUREMENT NO. COMPILED BY CHECKED BY	1 0-
FIRST	- <u> </u>
DATE 89/94 7/13 19 89 PARTY 012, 175, 5W WIDTH AREA VEL.	<u> </u>
METHOD 100 MM L TO SECS MA G.H. CHANGE O IN B HAS	<u> </u>
METER TYPE NA AFTER NA SPIN BEFORE MEAS. WA AFTER NA	
STR., S	1 1
MEASUREMENT RATED EXCELLENT (2%), GOOD (5%), FAIR (8%), POOR (OVER 8%), BASED ON FOLLOWING CONDITIONS: CROSS SECTION	<u> </u>
FLOW YERY LOW-UNIFORM WEATHER WARM, MOSTLY SUNNY	· 1
OTHER 85 40 1545	<u> </u>
GAGE INSIDE STAFF - GOOD COND WATER 65 OF IS45	1 1
RECORD REMOVED PARUER INTAKE FLUSHED L: NO	1
OBSERVER	1

GAGE	GAGE READINGS		
TIME	RECORDER	INSIDE	OLITSIDE
1540	0.58	0.58	100
a 5 <i>5,1</i>	0.58	0.58	
WEIGHTED M.G.H.			
G.H. CORRECTION			
CORRECT M.G.H.			
	-		

č	Uischarge	64.																				
Area	8	0	2																			
Velocity			ati			153		ÇG	đ	0/53												
Time in Seconds				(*)	1	0.0153		0.0123		0,0					163							
Revolutions				3:2		 6,42		0.40		0.42			6	3	~	0.0						
Depth				3		0.06		0.00	2000	200					X11X	\						
Width																						
Distance from				7		27.	,,,,,	22	1610	24												

CONO

6000

STRUCTURE IN

REMARKS

0.20

G.H. OF ZERO FLOW_

FLUME

CONTROL CEMENT

APPENDIX A-3

Rating Curves

### APPENDIX A-3.1

Rating Curve Development Procedures

### Appendix A-3.1 Rating Curve Development Procedures

Channel Control Rating Development. - The development of the rating curve for a channel control station would normally use a graphical analysis of discharge measurements plotted on logarithmic graph paper. Upon review of the discharge measurements, made prior to the 1989 water year, for the only channel control station, Havana Interceptor, all were rejected as unreliable for rating curve development. Therefore, the following analysis was performed to derive a rating curve for Havana Interceptor:

- A normal depth hydraulic analysis was performed using HEC-2 to predict gage height and corresponding discharges from channel geometry.
- The predicted discharges and gage heights were plotted on logarithmic paper. The discharge was on the ordinate and the gage height was on the abscissa.
- A curve of connected straight-line segments was visually fitted through the plotted points.
- Endpoint coordinates of each straight-line segment were determined from the rating curve plot. A rating equation was derived in the form of a power curve (Rantz 1982).

The rating equation was of the form

 $Q = pG^N$ 

where

Q = discharge in cubic feet per second (cfs);

G = the gage height of the water surface in feet;

p = regression coefficient (dimensionless); and

N = regression coefficient (dimensionless), generally not equal to p.

Two different criteria were used to confirm the permanence and/or follow shifts in the rating curve for Havana Interceptor. These criteria are as follows:

- Instantaneous discharge measurements made during the 1989 water year must be
  within ± 5 percent of the rating curve discharge corresponding to the same gage
  height in order to confirm the permanence of the rating curve.
- For low-flow measurements, the ± 5 percent criteria may be too stringent because of station control insensitivity; therefore, departures greater than ± 5 percent are

acceptable and confirm the permanence of the rating curve if the indicated shift in stage does not exceed 0.02 feet.

A detailed analysis of each instantaneous discharge measurement made during the 1989 water year at this station is presented in Appendix A-5.

Section Control Rating Development. - Laboratory-rated discharge-measurement structures have been installed at seven RMA stations (Highline Lateral, Ladora Weir, Basin A, South First Creek, North First Creek, First Creek Off-post, and South Plants Ditch). These structures provide section control for the complete range of stages falling within the capacity of each structure. Each artificial control stabilizes and constricts the channel at a section, and thereby simplifies the procedure for obtaining accurate records of discharge. Although these structures have been built in conformance with the dimensions of laboratory-rated weirs or flumes (the relationship of stage to discharge has been carefully measured under controlled conditions) differences between the model and prototype invariably exist, if only in approach-channel conditions (Rantz 1982). Therefore, instantaneous discharge measurements were made at artificial section control stations to verify the rating curves prepared for the respective model structures.

It should be emphasized that the primary purpose of the weir structures, and the triangular-throated flume at the First Creek Off-post station, was to measure flows within the capacity of the structures. Therefore, no attempt was made to determined the relationship of stage to discharge for stages and flows exceeding the capacity of the artificial section controls.

The laboratory rating for each structure was plotted along with the discharge measurements to discharge if a correlation existed. These laboratory ratings are based on depth of water above the zero-reference of the structure. Since the field-measured staff gage heights do not generally equal the water depths above the zero-reference of the structures, an offset was subtracted from each staff gage height to obtain the plotted depth value. This offset (e) is the gage height (in feet) corresponding to zero flow for the existing control. If the discharge measurements consistently plotted on the empirical rating curve, the empirical curve was used. For stations at RMA requiring modification of the empirical ratings, the verified stage-discharge measurements were plotted, and connected straight-line segments were fit to the plotted points. Regression analysis to fit a power curve was performed as previously described (Channel Control Rating Development) to obtain a calibrated rating curve and rating equations for the existing condition of each structure. For the stations where zero on the staff gage does not correspond to zero flow, the rating equation will be of the form

$$Q = p(G-e)^N$$

where

Q = discharge in cubic feet per second (cfs);

- (G-e) =head or depth of water on the control in feet;
- G = the gage height of the water surface in feet;
- e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero flow for a channel control or a section control of irregular shape;
- p = regression coefficient (dimensionless); and
- N = regression coefficient (dimensionless), generally not equal to p.

Confirmation of the permanence of these rating curves followed the same criteria as previously described in Section 3.1.2.6, Rating Curve Development Procedures; and in this Appendix, Channel Control Rating Development.

The development of the rating curve for South First Creek followed the normal graphical analysis of instantaneous discharge measurements. The reliable instantaneous discharge measurements were plotted on logarthmic graph paper with the discharge on the ordinate and the corresponding gage height on the abscissa. A curve of connected straight-line segments was visually fitted through the plotted points. Endpoint coordinates of each straight-line segment were determined from the rating curve plot. Regression analysis to fit a power curve was performed, as previously described (channel control rating development), to obtain a calibrated rating curve and equations for the existing condition of the structures. The rating curve required extrapolation beyond the range defined by discharge measurements for low flows. A table of gage height and discharge was generated by using the rating equation in the defined region for the lowest flows. These points were plotted on rectangular-coordinate graph paper along with the gage height of zero flow, and a smooth curve was drawn to merge the point of zero flow with the defined range of points (Rantz 1982). Several points from this extrapolated curve below the defined segment were transferred onto the logarithmic paper. Straight-line segments were connected between selected extrapolated points and equations were derived for the segments as previously described.

Upon review of the four instantaneous discharge measurements made at the North First Creek gaging station, only one was accepted as reliable for rating curve development. Therefore, the following analysis was performed to derive a rating curve for this station:

- A normal depth hydraulic analysis was performed using HEC-2 to predict gage height and corresponding discharges from channel geometry.
- The predicted discharges and gage heights were plotted on logarthmic graph paper, along with the one reliable discharge measurement.

- A curve of connected straight-line segments was visually fit through the plotted points.
- Endpoint coordinates of each straight-line segment were determined from the rating curve plot and regression analysis to fit a power curve, as previously described (channel control rating development).

A detailed analysis of each instantaneous discharge measurement made during the 1989 water year at each of these stations is presented in Appendix A-5.

Compound Control Rating Development. - The development of rating curves for the compound control stations (South Uvalda, North Uvalda, and Peoria Interceptor) utilized a procedure that was a combination of the procedures delineated in the previous two station control sections (section control and channel control). Additional considerations included the following:

- Discharge measurements were evaluated to determine if the measured discharges and
  corresponding staff readings could occur theoretically. This evaluation was conducted
  using HEC-2 to simulate the channel hydraulics. Discharge measurements that
  appeared invalid based upon the HEC-2 analysis were not used in the rating curve
  development.
- The rating curves required extrapolation beyond the range defined by discharge measurements for high flows. An analysis was performed using HEC-2 to determine if the transition from section control to channel control had occurred at the highest recorded stage. In all cases, this transition had not occurred. Further analysis demonstrated that it was inappropriate to use HEC-2 for the high flow extrapolation.

A hydraulic analysis using HEC-2 was attempted to predict the higher flows. (Note however, that these higher flows are section controlled.) This was done by assuming critical depth at the control section and that normal depth would then occur at the gage section. The present stations were constructed such that there is insufficient distance between the gage section and the control section. The result is that normal depth occurs upstream of the gage section, therefore, yielding an unrealistic result.

The high flow extrapolation was done using the Manning equation:

$$Q = 1.486 AR^{2/3} S^{1/2}$$
  
where

Q = discharge (cfs);

n = Manning's channel roughness coefficient (dimensionless);

A = cross-sectional area (ft²);

 $R = \text{hydraulic radius} = \frac{A}{P}$ ;

P = wetted perimeter (ft); and

S = slope (ft/ft).

The cross-section geometry corresponding to the maximum recorded gage height was plotted from reach survey data to determine the cross-sectional area and wetted perimeter at the location of the staff gage. The slope of the corresponding stream surface energy gradient was not available. Since average streambed slope typically approaches the energy gradient at the higher stages (Rantz 1982), the average streambed slope was computed from contour maps or reach survey data for input to Manning's equation. The channel roughness coefficient, n, was determined from stage-discharge measurements and field observations of streambed and bank cover conditions. The calculated discharge was plotted on logarithmic paper and regression analysis was performed on this line segment as previously described.

Confirmation of the permanence of these rating curves followed the same criteria as previously described. A detailed analysis of each instantaneous discharge measurement made during the 1989 water year at each of these stations is presented in Appendix A-5.

APPENDIX A-3.2

Gage Height vs. Discharge

APPENDIX A-3.3

Head vs. Discharge

APPENDIX A-4

Rating Equations

SW01001, NORTH UVALDA STATION:

BROAD CRESTED CONCRETE WEIR DESCRIPTION:

**EQUATION FORM:**  $Q = p(G-e)^{N}$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and
N = regression coefficient (dimensionless), generally not equal to p.

Gage Height,					
G, Range	p	N	e	Valid	Period
(ft)			(ft)	Begin Date	End Date
-0.104 to -0.060	0.882177764	1.444590283	-0.105	10-01-88	09-30-89
-0.059 to 0.000	1.597817538	1.636135791	-0.105	10-01-88	09-30-89
0.001 - 0.015	0.118589583	0.205644337	0.00	10-01-88	09-30-89
0.016 - 0.03	0.184078048	0.310340083	0.00	10-01-88	09-30-89
0.04 - 0.05	0.356680281	0.498980945	0.00	10-01-88	09-30-89
0.06 - 0.09	0.631774902	0.689816811	0.00	10-01-88	09-30-89
0.10 - 0.15	2.323074133	1.230573848	0.00	10-01-88	09-30-89
0.16 - 0.20	5.667685192	1.700702010	0.00	10-01-88	09-30-89
0.21 - 0.515	12.65759878	2.199930256	0.00	10-01-88	09-30-89
0.516 - 0.975	14.63974813	2.419166422	0.00	10-01-88	09-30-89
0.976 - 2.00	14.95376940	3.257434047	0.00	10-01-88	09-30-89
2.01 - 2.54	45.64969387	1.647337806	0.00	10-01-88	09-30-89

STATION: SW01003, SOUTH PLANTS DITCH

DESCRIPTION: 90 DEGREE V-NOTCH WEIR PLATE

EQUATION FORM:  $Q = p(G-e)^N$ 

where: Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and

N = regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	р	N	e	Valid 1	Period
(ft)	<del></del>		<u>(ft)</u>	Begin Date	End Date
3.43 - 3.62	(1)	(1)	3.43	10-01-88	09-30-89
3.63 - 3.80	2.488803337	2.481549685	3.43	10-01-88	09-30-89
3.80 - 5.43 (2	33.30000000	1.500000000	3.80	10-01-88	09-30-89

- (1) For gage heights between 3.43 ft and 3.62 ft which corresponds to heads of 0.00 ft and 0.19 ft, use the given coefficients for the gage height range of 3.63 ft 3.80 ft. Note that the flow can only be estimated in the low-flow range due to the fact that the nappe may not spring free of the crest when the head is less than 0.2 ft.
- (2) For gage heights above 3.80 ft use the coefficients given to compute a flow. To this add 0.21 cfs, the maximum flow through the V-notch. Note that the flow can only be estimated in this range above 3.80 ft.

STATION: SW02001, LADORA WEIR

DESCRIPTION: 2-INCH-WIDE PLANKS FITTED ON TOP OF A CONCRETE WALL

EQUATION FORM:  $Q = p(G-e)^N$ 

where:

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and

N = regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	р	N	e	Valid I	Period
(ft)			(ft)	Begin Date	End Date
4.13 - 4.32	(1)	(1)	4.13	10-01-88	09-30-89
4.13 - 6.13	19.98000000	1.500000000	4.13	10-01-88	09-30-89

⁽¹⁾ For gage heights between 4.13 ft and 4.32 ft, which corresponds to heads of 0.0 ft and 0.19 ft, use the given coefficients for the gage height range of 4.33 ft - 6.13 ft. Note that the flow can only be estimated in the low-flow range due to the fact that the nappe may not spring free of the crest when the head is less than 0.2 ft.

STATION: SW08003, SOUTH FIRST CREEK

DESCRIPTION: CONCRETE COMPOUND WEIR

**EQUATION FORM:**  $Q = p(G-e)^{N}$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

= regression coefficient (dimensionless); and

p= regression coefficient (dimensionless); and N= regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	р	N	e	Valid	Period
(ft)			(ft)	Begin Date	End Date
0.03 - 0.12	0.274865251	1.562869813	0.00	10-01-88	09-30-89
0.13 - 0.20	30.32336677	3.781175623	0.00	10-01-88	09-30-89
0.21 - 1.38	4.970971764	2.657613623	0.00	10-01-88	09-30-89

STATION: SW11001, PEORIA INTERCEPTOR

DESCRIPTION: FLAT CRESTED WEIR WHICH CONSISTS OF A NARROW PLANK POSITIONED PERPENDICULAR

TO FLOW. CHANGED TO A 90 DEGREE V-NOTCH WEIR ON APRIL 14, 1989.

EQUATION FORM:  $Q = p(G-e)^N$ 

where: Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet;
 G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and

N = regression coefficient (dimensionless), generally not equal to p.

Gage Height,					
G, Range	P	N	e	Valid 1	Period
(ft)			(ft)	Begin Date	End Date
1.04 - 1.06	3.640718E-12	436.7207643	0.00	10-01-88	04-07-89
1.07 - 1.12	0.051158789	35.71755364	0.00	10-01-88	04-07-89
1.13 - 1.29	1.202206920	7.860705838	0.00	10-01-88	04-07-89
1.30 - 4.32	5.407527455	1.955820912	0.00	10-01-88	04-07-89
0.404 - 0.50	0.236237085	1.280211429	0.39	04-14-89	09-30-89
0.51 - 0.59	1.131299766	1.989813381	0.39	04-14-89	09-30-89
0.60 - 1.05	2.488803337	2.481549685	0.39	04-14-89	09-30-89
1.051 - 1.06	0.123984198	40.32966282	0.00	04-14-89	09-30-89
1.07 - 1.12	0.415469558	19.57665310	0.00	04-14-89	09-30-89
1.13 - 1.29	1.795908698	6.659737538	0.00	04-14-89	09-30-89
1.30 - 4.32	6.058487140	1.884610242	0.00	04-14-89	09-30-89

STATION: SW11002, HAVANA INTERCEPTOR

DESCRIPTION: CONCRETE LINED TRAPEZOIDAL CHANNEL

**EQUATION FORM:**  $Q = p(G-e)^{N}$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and

N = regression coefficient (dimensionless), generally not equal to p.

Gage Height,	_	N		Valid 1	Dorind
G, Range	p	14	e		
(ft)			<u>(ft)</u>	Begin Date	End Date
0.01 - 0.025	2.000000126	1.000000012	0.00	10-01-88	09-30-89
0.026 - 0.10	2.364864829	1.045426716	0.00	10-01-88	09-30-89
0.11 - 0.175	2.305695547	1.034422377	0.00	10-01-88	09-30-89
0.176 - 0.24	4.725356666	1.446111016	0.00	04-25-89	09-30-89
0.25 - 0.32	23.80114393	2.579018353	0.00	04-25-89	09-30-89
0.33 - 1.39	20.86833977	2.463609783	0.00	04-25-89	09-30-89
1.40 - 1.91	21.46649374	2.377791962	0.00	04-25-89	09-30-89
1.92 - 4.14	8.454697601	3.817702957	0.00	04-25-89	09-30-89
0.176 - 4.14	3.276612758	1.236048284	0.00	10-01-88	04-25-89

STATION: SW12005, SOUTH UVALDA

DESCRIPTION: V-NOTCH IN A 12 INCH WIDE CONCRETE WEIR

**EQUATION FORM:**  $Q = p(G-e)^N$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet;
G = the gage height of the water surface in feet;
e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and N = regression coefficient (dimensionless); regression coefficient (dimensionless), generally not equal to p.

Gage Height,						
G, Range	p	N	e	Valid	Period	
(ft)			(ft)	Begin Date	End Date	
3.428 - 3.57	4.315263E-29	48.79427888	0.00	10-01-88	09-30-89	
3.58 - 3.84	1.627457E-16	26.03831775	0.00	10-01-88	05-08-89	
3.85 - 4.31	7.204057E-14	21.50994769	0.00	10-01-88	05-08-89	
4.32 - 4.82	0.000700004	5.768606020	0.00	10-01-88	05-08-89	
4.83 - 4.92	1.199150E-29	43.49109493	0.00	10-01-88	09-30-89	
4.93 - 5.10	6.693750E-10	14.95383007	0.00	10-01-88	09-30-89	
5.11 - 8.00	0.014836562	4.572277074	0.00	10-01-88	09-30-89	
3.58 - 4.06	1.931987E-19	31.33173826	0.00	05-09-89	09-30-89	
4.07 - 4.82	0.000653393	5.812418902	0.00	05-09-89	09-30-89	

SW12007, HIGHLINE LATERAL STATION:

**DESCRIPTION:** CIPPOLETTI WEIR

 $Q = p(G-e)^N$ **EQUATION FORM:** 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and N = regression coefficient (dimensionless), generally not equal to p.

Gage Height,					
G, Range	. р	N	е	Valid	Period
(ft)	<del>-</del>		(ft)	Begin Date	End Date
0.01 - 0.04	5.999999825	0.99999995	0.00	10-01-88	09-30-89
0.05 - 0.09	11.77702045	1.209511252	0.00	10-01-88	09-30-89
0.10 - 0.20	15.97301939	1.336071751	0.00	10-01-88	09-30-89
0.21 - 0.33	26.14011331	1.642122716	0.00	10-01-88	09-30-89
0.34 - 1.00	54.66181761	2.307513945	0.00	10-01-88	09-30-89

STATION: SW24002, NORTH FIRST CREEK

**DESCRIPTION:** CONCRETE COMPOUND WEIR

**EQUATION FORM:**  $Q = p(G-e)^N$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet;
G = the gage height of the water surface in feet;

gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and
N = regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	p	N	e	Valid	Period
(ft)			_(ft)	Begin Date	End Date
0.084 - 0.25	4.547328047	2.470675002	0.00	10-01-88	09-30-89
0.26 - 1.24	3.522261553	2.286416481	0.00	10-01-88	09-30-89
1.25 - 1.70	3.174816454	2.769205688	0.00	10-01-88	09-30-89

STATION: SW36001, BASIN A

**DESCRIPTION:** 90 DEGREE V-NOTCH WEIR PLATE

**EQUATION FORM:**  $Q = p(G-e)^{N}$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and
N = regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	р	N	e	Valid	Period
(ft)			(ft)	Begin Date	End Date
0.07 - 0.26	(1)	(1)	0.07	10-01-88	09-30-89
0.27 - 1.32	2.488803337	2.481549685	0.07	10-01-88	09-30-89

(1) For gage heights between 0.07 ft and 0.26 ft which corresponds to heads of 0.0 ft and 0.19 ft use the given coefficients for the gage height range of 0.27 ft - 1.32 ft. Note that the flow can only be estimated in the low-flow range due to the fact that the nappe may not spring free of the crest when the head is less than 0.2

SW37001, FIRST CREEK OFF POST STATION:

DESCRIPTION: CONCRETE TRIANGULAR-THROATED FLUME

**EQUATION FORM:**  $Q = p(G-e)^N$ 

Q = Discharge in cubic feet per second;

(G-e) = head or depth of water on the control in feet; G = the gage height of the water surface in feet;

e = gage height in feet of zero flow for a section control of regular shape, or the gage height of effective zero

flow for a channel control or a section control of irregular shape;

p = regression coefficient (dimensionless); and
N = regression coefficient (dimensionless), generally not equal to p.

Gage Height, G, Range	p	N	e	Valid	Period
(ft)	-		(ft)	Begin Date	End Date
0.50 - 0.54	0.124999989	0.99999979	0.50	06-15-89	09-30-89
0.55 - 0.59	1.226773025	1.709511275	0.50	06-15-89	09-30-89
0.60 - 0.75	4.306533142	2.231012279	0.50	06-15-89	09-30-89
0.76 - 2.50	6.853180828	2.566146561	0.50	06-15-89	09-30-89

### APPENDIX A-5

Comparison of Instantaneous Discharge
Versus Computed Discharge

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE NOMPARISON OF INSTANTANEOUS DISCHARGE (SW01001)

		 	$\neg$	-	1
(12)	Comments				
(11) Measurements	used for Rating Curve Development	No instantaneous discharge measurements were made during the 1989 water year at this station.			
(10)=(4)-(9) (11) Measurem	Difference in Gage ht. (ft.)	89 water year			
6)	Computed Gage ht. (ft.)	during the 19			
(8) =100* [(6)-(7)]/(7)	Difference in Computed Discharge Gage ht Gal (%)	s were made			
ω	Computed Discharge (cfs)	measuremen			
(9)	Instan- taneous Discharge (cfs)	ons discharge			
t	Start, Stop Gage Height (feet)	No instantant			
( <del>\$</del> )	Start, Stop Gage Height (feet)				
(3)	Start, Stop Time (hrs)				
(2)	Date				
ε	Meas- urement Number				

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE SOUTH PLANTS DITCH (SW01003)

		 	_	-11
(12)	Comments			
(11) Measurements	used for Rating Curve Development	No instantaneous discharge measurements were made during the 1989 water year at this station.		
(10)=(4)-(9) (11) Measurement	Difference in Gage ht. (ft.)	89 water year		
(6)	Computed Gage ht. (ft.)	during the 19		
(8) =100* [(6)-(7)]/(7)	Difference in Discharge (%)	s were made		
ω	Computed Discharge (cfs)	measurement		
(9)	Instan- taneous Discharge (cfs)	ous discharge		
(5) New	p Start, Stop Gage Height I	No instantane		
(4) Oid	Gage Height (feet)			
(3)	Start, Stop Time (hrs)			
(2)	Date			
ε	Meas- urement Number			

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE LADORA WEIR (SW02001)

		 _	 	,
(12)	Comments			
(10)=(4)-(9) (11) Measurements	used for Rating Curve Development	No instantaneous discharge measurements were made during the 1989 water year at this station.		
(10)=(4)-(9)	ference in age ht (ft.)	89 water year		
(6)	Computed Gage ht. (ft.)	during the 19		
(8) = $100*$ [(6)-(7)]/(7)	Difference in Computed in Discharge Gage ht Ga (%) (ft.)	s were made		
ω	Computed Discharge (cfs)	measurement		
(9)	Instantane taneous Discharge (cfs)	ous discharge		
	Start, Stop Gage Height (feet)	No instantane		
(4) Old	Start, Stop Gage Height (feet)			
(3)	Start, Stop Time (hrs)			
(2)	Date			
ε	Meas- urement Number			

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * SOUTH FIRST CREEK (SW08003)

(12)  Comments	RLSA, Pygmy #625, downstream 25'	RLSA, Pygmy #625, downstream 45' below gage	RLSA, 200mm flume, downstream 40' below gage	RLSA, 200mm flume, downstream 40' below gage	RLSA, Pygmy #625, downstream 40' below gage	RLSA, 200mm flume, downstream 30' below gage	RLSA, 100mm flume, downstream 30' below gage	RLSA, 100mm flume, downstream 30' below weir	RLSA, 100mm flume, downstream 30' below weir
(11) Measurements used for Rating Curve Development		×	×	×	×	×	×	×	×
(10)=(4)-(9)  Difference in  Gage ht. (ft.)	90:04	0.01	-0.01	-0.02	-0.03	0.00	0.01	-0.01	0.01
(9) Computed Gage ht. (ft.)	0.45	0.57	0.48	0.52	1.26	0.48	0.12	0.23	0.19
(8) =100* [(6)-(7)]/(7) Difference in Discharge (%)	-21.3	0.0	7.5	8.9	7.0	-2.8	0.0	11.1	-14.3
(7) Computed Discharge (cfs)	0.75	1:1	0.67	0.79	8.6	0.71	0.01	0.09	0.07
(6) Instantancous Discharge (cfs)	0.59	1	0.72	0.86	9.2	69.0	0.01	0.10	90:0
(5) New Start, Stop Gage Height (feet)		1				:		;	-
(4) Old Start, Stop Gage Height (feet)	0 40	0.58	0.47	$\perp$	L	0.48	0.13	0.22	0.20
(3) Start, Stop Time (hrs)	1130 1205	1536 1647	1000 1042	0915 0935	1020,1110	1228,1245	1335,1343	1440,1450	<del></del>
(2) Date	04/04/00	04/12/80	0475/80	05/03/89	05/05/89	06/20/89	07/20/89	09/26/89	68/67/60
(1) Meas- urement Number		1,	7 6				,	~	6

^{*} Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * PEORIA INTERCEPTOR (SW11001)

(12) Comments		RLSA, Long throated flume, downstream 30' below gage	RLSA, 200mm flume, downstream 30' below gage		KLSA, 100mm flume, downstream 100 below gage	
(11) Measurements used for Rating Curve Development						
(10)=(4)-(9) (11)  Measurem  Difference used fo		0.03	-0.03		0.10	
(9) Computed Gage ht. (ft.)		0.30	0.33		0.21	
(7) (8) =100* (9) (6)-(7)]/(7) Difference in Computed in Discharge Discharge Gage ht. (cfs) (7%) (ft.)		-18.8	23.1		-64.3	
(7) Computed Discharge (cfs)		0.16	0.13		0.14	
(6) Instantancous Discharge (cfs)		0.13	0.16	2	0.05	
(5) New Start, Stop Gage Height (feet)		1			1	
(4) Old Start, Stop Gage Height (feet)	_#	0.72	090	60.0	0.70	
(3) Start, Stop Time (hrs)	Ì	1116.1125	1710177	1	0845,0900	
(2) Date		0476/89	00/00/20	01/20/02	68/12/60	
(1) Measurement		-		7	3	

^{*} Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * HAVANA INTERCEPTOR (SW11002)

(12)	Comments	RLSA, Pygmy #625, downstream 8' below bubble line	RLSA, Pygmy #625, 10' above gage	RLSA, 200mm flume, downstream 350' below gage	RLSA, 200mm flume, downstream 500' below gage
(11) Measurements	used for Rating Curve Development			×	×
(10)=(4)-(9) (11) Measurem	Difference in Gage ht. (ft.)	N/A	0.07	0.01	-0.02
6)	Computed Gage ht. (ft.)	N/A	0.17	0.17	0.21
(8) =100* [(6)-(7)]/(7)	Difference in Discharge (%)	N/A	-38.3	-7.5	14.0
ω	Computed Discharge (cfs)	N/A	09.0	0.40	0.43
(9)	Instantaneaneous Discharge (cfs)	1.5	0.37	0.37	0.49
(S) New	Start, Stop Gage Height (feet)	N/A	0.29	0.23	0.24
(4) Old	Start, Stop Gage Height (feet)	0.52	0.24**	0.18**	0.19**
(3)	Start, Stop Time (hrs)	1515.1545		ľ	1020,1030
(2)	Date	04/11/89	04/26/89	07/20/89	09/27/89
(1)	Meas- urement Number	-	,   ~	3	4

^{*} Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.
** Computed by (New Gage - 0.05 offset)

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * SOUTH UVALDA (SW12005)

		_						
(12)	Comments	RLSA, Pygmy #625, downstream 50' below gage	RLSA, Pygmy #625, downstream 50' below gage	RLSA, Pygmy #625, downstream 50' below gage	RLSA, Long throated flume, downstream 30' below gage	RLSA, 200mm flume, downstream 40' below gage	RLSA, 200mm flume, downstream 30' below gage	RLSA, 200mm flume, downstream 50' below gage
(11) Measurements used for	Rating Curve Development	×	×		X	X	×	
(10)=(4)-(9) Difference	in Gage ht. (ft.)	0.01	0.00	-0.06	00'0	0.00	0.02	0.08
6)	Computed Gage ht. (ft.)	3.84	3.85	3.88	3.84	3.88	3.81	3.74
(8) =100* [(6)-(7)]/(7) Difference	in Discharge (%)	-7.1	7.1	59.1	-3.7	0.0	-16.7	-48.5
6	Computed Discharge (cfs)	0.28	0.28	0.22	0.27	0.54	0.36	0.33
(6) Instan-	taneous Discharge (cfs)	0.26	0.30	0.35	0.26	0.54	0.30	0.17
(5) New Start. Stop	Gage Height (feet)				i		0.51	0.50
(4) Old Start. Ston		3.85.3.85	3.85.3.85	1	3.84.3.84	3.88,3.88	3.83**	3.82**
(3)	Start, Stop Time (hrs)	1520 1547 3.85 3.85	1544,1613	1203,1331	1525,1535	1330,1349		1515,1515
(2)	Date	03/21/89	03/27/89	04/17/89	04/21/89	06/20/89	09/26/89	68/67/60
(1)	Meas- urement Number	-	,	, "	. 4	~	٥	7

^{*} Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.
** Computed by (New Gage + 3.32 offset)

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE HIGHLINE LATERAL (SW12007)

		 _	 - 1
(12)	Comments		
Σ	used for Rating Curve Development	No instantaneous discharge measurements were made during the 1989 water year at this station.	
(10)=(4)-(9) (11) Measurem	Difference in Gage ht. (ft.)	89 water year	
6	Computed Gage ht. (ft.)	furing the 198	
(8) =100* [(6)-(7)]/(7)	Difference in Discharge (%)	s were made	
ω	s Computed in Computed ge Discharge Discharge Gage ht. GCs) (%) (ft.)	measurement	
(9)	Instan- taneous Discharge (cfs)	ous discharge	
(5) New	Start, Stop Gage Height (feet)	No instantane	
(t) Oid	Start, Stop Gage Height (feet)		
(3)	Start, Stop Time (hrs)		
(2)	Date		
(1)	Meas- urement Number		

COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * NORTH FIRST CREEK (SW24002)

(12) Comments	RLSA, Pygmy #625, downstream 40' below gage RLSA, Pygmy #625, downstream 35' below gage RLSA, 200mm flume, downstream 30' below gage RLSA, Pygmy #625, downstream 30' below gage
(11) Measurements used for Rating Curve Development	×
(10)=(4)-(9) Difference in Gage ht. (ft.)	0.12 0.11 0.00 -0.05
(9) Computed Gage ht. (ft.)	0.35 0.35 0.52 0.98
(8) =100* [(6)-(7)]/(7) Difference in Discharge (%)	49.2 48.3 0.00 13.3
(7) Computed Discharge (cfs)	0.63 0.60 0.79 3.0
(6) Instantaneous Discharge (cfs)	0.32 0.31 0.79 3.4
(5) New Start, Stop Gage Height (feet)	1 1 1
(4) Old Start, Stop Gage Height (feet)	0.47,0.47 0.46,0.47 0.52,0.52 0.93,0.92
(3) Start, Stop Time (hrs)	1510,1530 1056,1128 1005,1030 0930,1041
(Z) Date	04/06/89 04/21/89 05/03/89 05/15/89
(1) Measurement Number	1 2 2 4

* Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE BASIN A (SW36001)

			,	_		1
(12)		Comments				
≥	used for Rating	- H		No instantaneous discharge measurements were made during the 1989 water year at this station.		
(10)=(4)-(9)	Computed in Computed in Discharge Care ht	(ft.)		89 water year		
6	Computed	(ft.)		furing the 19		
(8) =100* [(6)-(7)]/(7)	Difference in	(%)		s were made o		
Θ				measurement		
9)	Instan- taneous	Cofs)		ous discharge		
	Start, Stop Gage			No instantane		
(4) Old	Start, Stop Gage	(fæt)				
(3)	Start, Stop	(hrs)				
(2)		Date				
(1)	Meas-	Number				

# COMPARISON OF INSTANTANEOUS DISCHARGE VERSUS COMPUTED DISCHARGE * FIRST CREEK OFF-POST (SW37001)

			$\overline{}$		
(12)	Comments	RSLA, Pygmy #625, upstream 40' above gage	RSLA, Pygmy #625, upstream 30' above gage	RLSA, 200mm flume, upstream 40' above gage	RLSA, 100mm flume, downstream 10' below gage
Ĭ	used for Rating Curve Development				×
(10)=(4)-(9)	Difference in Gage ht (ft.)	N/A	N/A	N/A	1
(6)	Computed Gage ht. (ft.)	N/A	N/A	N/A	60.0
(8) =100* [(6)-(7)]/(7)	Difference in Discharge (%)	N/A	N/A	N/A	0.0
(C)	Computed Discharge (cfs)	N/A	N/A	N/A	0.02
(9)	Instan- taneous Discharge (cfs)	0.29	0.31	0.54	0.02
(5) New	Start, Stop Gage Height (feet)		-	1	0.58
(4) Old	Start, Stop Gage Height (feet)	0.51	0,52	0	1
(3)	Start, Stop Time (hrs)	1435 1453		-	-
(2)	Date	04/07/80	04/20/89	05/03/89	07/13/89
(1)	Meas- urement Number		1		4 **

^{*} Computed discharge and computed gage height were obtained from rating curves and do not necessarily represent gage height output produced from strip charts.

APPENDIX A-6

Continuous Gage Height Recorders
Equipment and Procedures

APPENDIX A-6.1

Stevens Type F Equipment Specifications and Procedures

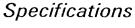
### A-6.1 Stevens Type F Recorder Procedures

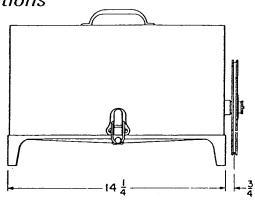
During Water Year 1989 there were eleven surface water stations equipped with Stevens Type F water level recorders. The Stevens Type F recorders currently in use are Model 68's equipped with quartz multispeed timers and either multiple D-cell batteries or a single mercury battery power source. The Stevens Type F recorder is attached to a float, beaded wire, and pulley. Changing water levels in the stilling well cause the float to rise and fall which turns the recorder's drum proportionally. The quartz multispeed timer moves a pen across the strip chart at a uniform speed. The resulting record produced is a graph of water level versus time.

Weekly activities at the continuous monitoring stations included collecting and replacing strip charts, checking recorder operation, calibrating strip charts to the outside observed stage and initial time, and removing obstructions from stilling wells, channel sections and control structures. Freezing conditions prohibited the use of the recorders from late November 1988 through February 1989. Stage data is invalid during periods of freezing because the frozen water in the stilling well incapacitates the recorder's float and pulley system.

The strip chart analog stage data were reduced to a digitized format using the computer program CPSPC (Radian Corp., October 1987, Version 3.1) in conjunction with a digitizer. After a strip chart has been digitized, the software program transforms the digital file into units used by the analog record. In this case, the scale was correlated to Julian date and scientific hours for time and to 0.01 ft for gage height. The minimal digitized strip chart points chosen were 0.00, 12.00, and 24.00 for each record day. Other significant stage points selected for digitization were high flow events, when gage heights were digitized at a minimum of 15 minute intervals, and any stage points that exhibited 0.1+ ft of deflection within any 2 hour period. Finally, the digitized stage output was compared to the strip chart analog record and corrected to the observed staff gage settings.

# STEVENS TYPE F Water-level Recorder





# GAGE SCALES ADAPT RECORDER TO WATER-LEVEL RANGE

The relationship between the rotation of the float pulley and the chart drum is set by gearing. Changes in the gearing, or the pulley circumference, thus affect the ratio between the chart record and water-level changes. This ratio is known as gage scale.

To make a field change from any scale listed in the Table, below, (except 1:20 and 1:24) to another, requires only the substitution of a pair of gears. The 1:20 and 1:24 scales are obtained by installing the 750 mm. or 36 in. circumference ring on the float pulley of a Recorder geared for the 1:10 or 1:12 scales, respectively.

Table 3

GAGE SCALES FOR STEVENS TYPE F RECORDER
(obtained by gearing)

	Water Level	Value of	
Gage Scale	Change for 1	Smallest	Float Pulley
	Rev. of Drum	Chart Division	Required
English Decimal	System —	F1/F2 F3 Chart	
1:1	1.0 ft.	.01 ft1 in.	18 in. circ.
1:2	2.0 ft.	.02 ft2 in.	18 in. circ.
1:5	5.0 ft.	.05 ft5 in.	18 in. circ.
1:10	10.0 ft.	.10 ft. 1.0 in.	18 in. circ.
1:20	20.0 ft.	.20 ft. 2.0 in.	36 in. circ.
English Duo-Deci	imal System—	F3 Chart	
10:12	1,2 ft.	.01 ft.	18 in. circ.
5:12	2.4 ft.	.02 ft.	18 in. circ.
1:6	6.0 ft.	.05 ft.	18 in. circ.
1:12	12.0 ft.	.10 ft.	18 in. circ.
1:24	24.0 ft.	.20 ft.	36 in. circ.
Metric System-		F4 Chart	
1:1	0.3 m.	2 mm.	375 mm. circ.
1:2	0.6 m.	4 mm.	375 mm. circ.
1:5	1.5 m.	10 mm.	375 mm. circ.
1:10	3.0 m.	20 mm.	375 mm. circ.
1:20	6,0 m.	40 mm.	750 mm. circ.
	•		

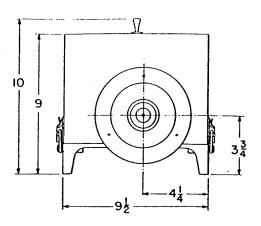
**NOTE:** Range is unlimited since the chart drum may make any number of revolutions.

## Leupold & Stevens, Inc.

P.O. Box 688

Tel. 503 646-9171

Beaverton, Oregon 97005 U.S.A. · Cable LEUSTEV, Beaverton.



### Basic Type F Recorder Specifications

Float operated water level recorder with horizontal ball bearing chart drum; rectangular chart 12 inches (or 30 cm) x 9.6 inches; capillary pen with Lucite reservoir; 1 oz. black ink; 4 legged cast aluminum base for shelf or table mounting; metal cover without port.

### **APPLICATION OPTIONS:**

Type of	pen	drive:	
---------	-----	--------	--

8 day spring driven clock					
☐ 30 day weight driven clock					
synchronous motor forV,Hz					
Time scale:					
(refer to Table 1 for availability)					
Gage scale:					
(refer to Table 3 for availability)					
Chart:					
☐ F1 ☐ F3 ☐ F7					
☐ F2 ☐ F4 ☐ F8					

### Float Pulley:

18 in. or 375 mm circumference for			
□ beaded float line □ perforated tape			
36 in. or 750 mm pulley ring for 1:20 and 1:24 gage scales			

### Float line/tape:

feet stainless steel float line with
set end hooks
feet stainless steel perforated
and graduated float tape with
set end hooks and index bracke

### Float with counterweight:

Toat with counter weights				
☐ 2½ in.	☐ 5 in.			
☐ 3 in.	☐ 6 in.			
☐ 3½ in.	☐ 7 in.			
☐ 4 in.	☐ 8 in.			

### Accessories:

Scow float with adjustable anchor rod and
counterweight Automatic clock starter (for 8 day clock only)

Cover with viewin	g port
-------------------	--------

Note: See Price List for options available. Manufacturer reserves the right to make changes in design or materials for product improvement, without notice.

Pencil stylus (in place of pen)

APPENDIX A-6.2

Datapod Equipment Specifications and Procedures

### A-6.2 DP115 Datapod Procedures

The Omnidata International, Inc. model DP115 datapod, equipped with a 10-turn potentiometer, operates in conjunction with the Stevens Type F recorder. Data collected by the DP115 is used to obtain digital stage measurements in conjunction with the Stevens recorder.

Proper setup of the DP115 datapod requires that two recording functions are set:

- Resolution (stage change required to record a data point); and
- Sampling time interval.

The recording functions are set on the datapod using the control switches located on the inside panel. Switches 1 and 2 control resolution, and switches 3 and 4 control sampling interval. A resolution of 0.01 ft and a sampling interval of 30 minutes is set on the data pod. The datapod will record a change in stage of 0.01 ft or greater at 30 minute intervals, however, if the stage change is less than 0.01 ft the datapod does not record a data point. This function allows the datapod to conserve space on the data storage module (DSM). A stage data point is also recorded when the unit is powered up and will record a data point at 24 hour intervals regardless of any change in stage.

The datapod's DSM is changed monthly along with the units batteries. Data "short dumps" are acquired weekly and recorded in the log book. The following procedures are used to acquire the "short dump" and to change the DSM and batteries on the datapod.

### Procedure:

Note: ** indicates that a display has to be recorded in the log book.

[] indicates a display that will appear on the DP115.

- 1. **RECORD station number in the log book.
- 2. **RECORD the DP115 serial number on the log book.
- 3. **RECORD the display message [RUN] in the log book: Display.
- 4. Loosen the four screws on the face plate and separate the face plate from the case. (do not remove screws if only a short dump is being acquired.)

### SHORT DUMP

Note: The DP115 will advance through the following sequence fairly quickly. If a display is missed, the sequence can be reinitiated by pressing the button on the outer case after the last display [RUN] is shown.

5. Push the button on the outer case -

[DLY] will be displayed, then -

[CHN1] will be displayed, then -

a number will be displayed indicating the current stream stage.

**RECORD the number with the label: CHN1

[ERR] will be displayed, then -

a number indicating the number of errors will be displayed.

**RECORD this number with the label: ERR

[TIME] will be displayed, then -

a number indicating the time (relative to startup) will be displayed.

**RECORD this number with the label: TIME

[DSM USED] will be displayed, then -

a number will be displayed indicating the amount of data storage modules space so far.

**RECORD this number with the label: DSM USED

[RUN] will be displayed indicating the DP115 is finished with the short dump.

Note: continue procedures only if DSM and batteries are to removed.

Caution: There is a 24- hour clock in the DP115 that displays time to the nearest tenth hour.

Example: When the [TIME] display reads XXX.1, the DP115 has advanced 6 minutes into the hour.

The DP115 clock begins as soon as the last battery is inserted.

The DP115 is set to make a stream gage recording every 30 minutes. A 30 minute interval will be denoted on the [TIME] display as XXX.0 or XXX.5. If it is getting close to a recording interval such as XXX.4 or XXX.9, wait until after the reading has been make and then continue. (The LED will flash when a reading is being taken.)

- 6. Remove a battery from the battery pack to power down the DP115.
- 7. **RECORD the time of day with the label: Stop Time.
- 8. **RECORD the staff gage reading with the label: Staff Gage (ft).

Caution: Be sure your fingers are clean and dry before touching the DSM. Care should be taken no to touch any of the pins on the DSM.

9. Remove the DSM from the back of the face plate by gently pulling it straight up and place it in the protective container with the pins on the DSM inserted into the anti-static foam in the plastic storage container.

### POWER UP

- 10. Replace the battery removed (or replace all batteries) to power up the DP115.
- 11. [DATA POD 115] will appear in the display window, then -
- 12. [SAM] will appear in the display window, then a number indicating the sample interval.
  - **RECORD this number with the label: SAM.
- 13. [RES] will appear in the display window, then -a number indicating the deviation from straight-line resolution.**RECORD this number with the label: RES
- 14. [DLY] will appear in the display window, then -
- 15. [CHN1] will appear in the display window, then a number indicating the sensor test for Channel 1.

  **RECORD this number with the label: CHN1.
- 16. Push in and hold the external button until [PLUG IN DSM PUSH] appears in the display window, then -
- 17. Insert a new DSM in the DP115.
  - **RECORD the DSM number with the label: DSM#IN

Note: If either test fails, remove a battery, replace the DSM with another one and start the procedure again from "Power Up".

- 23. If both tests pass:
  - **RECORD the time of day with the label: Start Time.
  - **RECORD the staff gage height with the label: Staff Gage (ft).
- 24. [RUN] should then be displayed in the display window.
  - **RECORD RUN with the label: DISPLAY
- 25. Replace the face plate on the case and tighten the 4 screws.

The DSM containing data is read with an Omnidata Model 217 Reader. The DSM Reader transmits the data from the DSM to a computer file where it can be further reduced to a stream stage record.

### **DP115 DATAPOD SPECIFICATIONS**

### **FUNCTION:**

Single channel stream stage recorder.

### TYPE OF SENSORS:

10-turn potentiometer. 5,000 to 100,000 Ohm resistance.

### **RESOLUTION:**

0.01 foot in 10 feet of water.

### **RECORDING FUNCTIONS:**

Records time of change and amount of change in water level.

### SAMPLING INTERVALS:

User sets the time of day.

### INPUT CONNECTOR:

3-pin environmentally sealed.

### **DATA STORAGE:**

Medium: Non-volatile, interchangeable memory module. Retrieval: Via built-in display or Model 217 Reader.

### OPERATING CONTROLS AND DISPLAY:

Display: 4 1/2 digit LCD with low battery indicator. Push Button: control data display and retrieval.

### CLOCK ACCURACY:

+- 3 minutes per month (-10C to + 60C).

### SELF TEST:

Performs self test functions on power-up.

### **OPERATING ENVIRONMENT:**

-35 deg C to + 60 deg C, 0 to 100% RH, dust and water tight.

### POWER:

8 alkaline AA penlight cells..

### SIZE AND WEIGHT:

6.3" x 3.3" x 2.3", 1.2 lb.

APPENDIX A-6.3

Data Logger Equipment
Specifications and Procedures

Data Logger/Bubbler System Procedures

Four Campbell Scientific CR-10 data logger/bubbler systems were put into operation at RMA during WY89. The CR-10 data logger/bubbler system provides stream stage data throughout the year including periods of freezing conditions.

Customized software was developed to operate the data logger and associated bubbler system. The data logger/bubbler system software controls several functions:

- operating the system on a specified uniform time interval;
- performing the calibration calculations; and
- storing the data in the RAM pack storage module.

This software can be loaded either by the use of the hand-held display or by transferring the program from a PC compatible computer to the unit's RAM pack storage module, then down loading the program from the RAM pack into the data logger. The time interval between the start of each measurement cycle is user-selectable and may range from 20 seconds to 6554 seconds. The measurement cycle interval used during WY89 was 900 seconds (15 minutes). Calibration of the data logger/bubbler system is based on two different pressure measurements made at a known distance apart in a reference cylinder located in each station's gage house. The software residing in the data logger performs the calibration calculation prior to each measurement cycle. During the routine monthly maintenance, the calibration is checked using the station's staff gage reading as a reference point, so that the accuracy of each measurement can be verified.

Data are retrieved from the from the RAM pack storage module using either SMCOM or PC208 software. Both SMCOM and PC208 are available from Campbell Scientific, Inc. These communication software programs run on PC compatible computers, additionally, the PC208 software also serves as a simple data formatting and programming tool for the data logger.

Various field operating procedures were used during WY89 for proper and continual operation of CR-10 data logger/bubbler system stations. They are as follows:

### 1. Reading and Recording the Current Datalogger Output

This procedure is performed during each weekly station visit. Each CR-10 is equipped with a hand help keypad and display. The following key entries denote specific display readouts. Output from the keypad's display is recorded in the field log book and a data sheet that is kept in the gage house. Additionally, nitrogen tank pressure, staff gage reading, and flow condition are recorded in the log book and data sheet.

```
*5 - (Real Time)
A - The Current Year
A - The Julian Day
A - The Time - Mountain Standard
*6 - (Field Data)
Α
#1 - Head above tube in stream.
#2 - Depth in reference tube above top line.
Α
#3 - Ambient Temp. - °C
Α
#4 - Reference differential - distance between lines in reference tube - (approx. 1 ft - 1.0).
Α
#5 - Battery voltage - should be above 12 v.
#6 (with Isco sampler), 0.01 = sample taken, 0.00 = no sample.
#20 and #21 - Time sample(s) taken.
       #20 - XXXX divide by 24 and add 1 = (day sample taken).
       #21 - minutes + #20 = (actual time sample taken).
```

### 2. Changing Batteries

The CR-10 data logger/bubbler system is powered by an industrial 12-volt, 15 amp-hour, sealed lead-acid battery. When the voltage falls below 12 volts, the battery is changed. The battery could be damaged if it is left in the field when the voltage drops below 12 volts. This is especially critical in the cold winter months.

The CR-10 has an internal battery pack consisting of eight alkaline D-cell batteries, that can be used as a back-up for the primary power supply. The following procedure is used to keep power applied to the unit while the external battery is being changed:

- 1. Insert the one D-cell battery back into the internal battery pack.
- 2. Disconnect the leads from the discharged external battery.
- 3. Connect a charged external battery.
- 4. Remove the D-cell battery from the internal battery pack.

### 3. Changing Nitrogen Tanks

Industrial nitrogen is supplied to the bubbler from a standard 2,200 psi nitrogen tank. The tank is equipped with a low pressure regulator to maintain a constant flow of 9 psi to the bubbler. The pressure to the bubbler can be changed by using the T-handle on the regulator. The regulator also has a gauge that indicates the pressure of nitrogen in the tank. When the tank pressure drops to approximately 500 psi, it is replaced with a full one. The following procedure is used to change the nitrogen tank:

- 1. With hand-held display, check *5 mode time to be sure that the instrument is not about to sample.
- 2. Close the valve on the top of the nitrogen tank.
- 3. With a 7/8" wrench, unscrew the flare nut on the regulator from the nitrogen tank orifice.
- 4. Unhook the safety chain and remove the empty tank from the shelter.
- 5. Place a full tank in the shelter and fasten the safety chain around it.
- 6. Place the regulator on the full tank and tighten the flare nut.

  Note: Slightly wiggling the regulator while tightening the flare nut will help ensure a tight fit to the mating fitting on tank.
- 7. Open the valve at the top of the bottle. The pressure to the bubbler should read 9 psi.
- 8. Check for leaks around the regulator flare nut and tank orifice. After the regulator is attached to the new tank, open the T-handle until 0 psi is read on low pressure gage. Observe the tank pressure gauge to determine if any pressure is lost (15 minutes should be adequate). If the pressure drops, there is a leak in the connection. If a leak is detected, close the valve on top of the tank and remove the regulator. Place the regulator in a different position on the orifice and retighten the flare nut. Repeat the procedure to check for leaks.

### **SPECIFICATIONS**

The following electrical specifications are valid for an ambient temperature range of -25 °C to +50 °C unless otherwise specified.

### **ANALOG INPUTS**

NUMBER OF CHANNELS: 12 single ended or 6 differential with any combination, software selectable.

CHANNEL EXPANSION: Increments of 32 channels multiplexed through a single CR10 channel with the Model AM32 Relay Scanner. Maximum of 6 AM32's possible.

ACCURACY OF VOLTAGE MEASUREMENTS AND ANALOG OUTPUT VOLTAGES: 0.2% of FSR, 0.1% of FSR (0 to 40 °C).

RANGE AND RESOLUTION: Ranges are software selectable for any channel. Resolution for single ended measurements is twice the value shown.

### Full Scale Range Resolution

±2.50 volts	333. microvolts
±0.25 volts	33.3 microvolts
±25.0 millivolts	3.33 microvolts
± 7.5 millivolts	1.00 microvolts
± 2.5 millivolts	0.33 microvolts

INPUT SAMPLE RATES: The fast or slow A/D conversion on the four lowest input ranges uses a 250 us or 2.72 ms signal integration time, respectively. Two integrations, separated in time by ½ of an AC line cycle, are used with the 60 Hz or 50 Hz noise rejection option. Differential measurements include a second sampling with reversed input polarity to reduce thermal offset and common mode errors. Input sample rates are the time required to measure and convert the result to engineering units.

Fast single ended voltage: 2.6 ms
Fast differential voltage: 4.2 ms
Slow single ended voltage: 5.1 ms
Slow differential voltage: 9.2 ms
Oiff. w/60 Hz rejection: 25.9 ms
Fast diff. thermocouple: 8.6 ms

### INPUT NOISE VOLTAGE:

Fast differential — 0.82 microvolts RMS Slow differential — 0.25 microvolts RMS Diff. w/60 Hz

rejection - 0.18 microvolts RMS

COMMON MODE RANGE: ±2.5 volts.

DC COMMON MODE REJECTION: >140 dB.

NORMAL MODE REJECTION: 70 dB (60 Hz with slow differential measurement).

INPUT CURRENT: 3 nanoamps max.

INPUT RESISTANCE: 200 gigohms.

### **EXCITATION OUTPUTS**

DESCRIPTION: The CR10 has 3 switched excitations, active only during measurement, with only one output active at any time. The off state is high impedance.

RANGE: ±2.5 volts.

RESOLUTION: 0.67 millivolts.

ACCURACY: Same as voltage input.

OUTPUT CURRENT: 20 mA @  $\pm$  2.5 V, 35 mA @  $\pm$  2.0 V, 50 mA @  $\pm$  1.5 V.

FREQUENCY SWEEP FUNCTION: A swept frequency square wave output between 0 and 2.5 volts is provided for vibrating wire transducers. Timing and frequency range are specified by the instruction.

## PERIOD AVERAGING MEASUREMENTS

DEFINITION: The time period for a specified number of cycles of an input frequency is measured, then divided by the number of cycles to obtain the average period of a single cycle.

INPUTS: Any single ended analog channel; signal dividing or AC coupling is normally required.

### INPUT FREQUENCY RANGE:

Range Code	Preamp Gain	Input Hysteresis	Maximum Frequency
4	1	10 mV	200 kHz
3	10	1 mV	50 kHz
' 2	33	300 uV	20 kHz
1	100	100 uV	8 kHz

REFERENCE ACCURACY: ±40 ppm.

RESOLUTION: ±100 nanoseconds divided by the number of cycles measured. Resolution is reduced by signal noise and for signals with a slow transition through the zero voltage threshold.

TIME REQUIRED FOR MEASUREMENT: Signal period times the number of cycles measured plus 1.5 cycles; minimum measurement time is 2 ms.

## RESISTANCE AND CONDUCTIVITY MEASUREMENTS

ACCURACY: 0.015% of full scale bridge output, limited by the matching bridge resistors. The excitation voltage should be programmed so the bridge output matches the full scale input voltage range.

MEASUREMENT TYPES: 6 wire and 4 wire full bridge; 4 wire, 3 wire, and 2 wire half bridge. Bridge measurements are ratiometric and dual polarity to eliminate thermal emf's. AC resistance measurements use a dual polarity 750 us excitation pulse for ionic depolarization, with the signal integration occurring over the last 250 us.

### **PULSE COUNTERS**

NUMBER OF PULSE COUNTER CHANNELS: 2 eight bit or 1 sixteen bit selectable.

MAXIMUM COUNT RATE: 2000 Hz, eight bit counters; 250 kHz, sixteen bit counters. Pulse counter channels scanned at 8 Hz.

MODES: Switch closure, high frequency pulse, and low level AC.

SWITCH CLOSURE MODE Minimum Switch Closed Time: 5 ms. Minimum Switch Open Time: 6 ms. Maximum Bounce Time: 1 ms open without count

HIGH FREQUENCY PULSE MODE Minimum Pulse Width: 2 us. Maximum Input Frequency: 250 kHz. Voltage Thresholds: Count upon transition from below 1.5 V to above 3.5 V. Maximum Input Voltage: ±20 V.

# LOW LEVEL AC MODE (Typical of magnetic pulse flow sensors, selected anemometers, etc.)

Min AC Input Voltage: 6 mV RMS Input Hysteresis: 11 mV. Max. AC Input Voltage: 20 V RMS

Frequency Range:

AC Input (RMS)	Range
20 millivolts	1 Hz to 100 Hz
50 millivolts	0.5 Hz to 400 Hz
150 millivolts to 20 V	0.3 Hz to 1000 Hz

(Consult factory if higher frequencies are desired.)

### **DIGITAL I/O PORTS**

8 ports, software selectable as binary inputs or control outputs.

OUTPUT VOLTAGES (no load): high  $-5 \text{ V} \pm 0.1 \text{ V}$ ; low -<0.1 V.

OUTPUT RESISTANCE: 500 ohms.

INPUT STATE: high ->3 V; low -<0.8 V.

INPUT RESISTANCE: 100 kohms.

### TRANSIENT PROTECTION

All input and output connections to the CR10 module are protected using RC filters or transzorbs connected to a heavy copper bar between the circuit card and the case. The CR10WP Wiring Panel includes additional spark gap and transzorb protection.

### **CPU AND INTERFACE**

PROCESSOR: Hitachi 6303.

MEMORY: 32k ROM, 16k RAM expandable to 64k.

DISPLAY: 8 digit LCD (0.5" digits).

PERIPHERAL INTERFACE: 9 pin D-type connector for keyboard/display, storage module, cassette, modern, printer, and RS232 adapter. Baud rates selectable at 300, 1200, 9600, and 76,800.

CLOCK ACCURACY: ±1 minute per month.

MAXIMUM PROGRAM EXECUTION RATE:
System tasks initiated in sync with realtime up to 64 Hz. One measurement with
tape transfer is possible at this rate without interruption.

### SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 volts.

TYPICAL CURRENT DRAIN: 0.5 mA quiescent. 13 mA during processing, and 35 mA during analog measurement.

BATTERIES: 7.5 Ahr alkaline D-cells or 5 Ahr rechargeable lead acid batteries, standard

### PHYSICAL SPECIFICATIONS

SIZE: 7.8" x 3.5" x 1.5"; 9" x 3.5" x 2.9" with CR10WP Wiring Panel. Input connectors extend length 0.15".

WEIGHT: 2 lbs.

### WARRANTY

Two years against defects in materials and workmanship.



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